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THE PHYSICIAN IN INDUSTRY:
A SYMPOSIUM

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Foreword

The introduction of the physician into the industrial organization, often made during periods of stress or to comply with legislative enactments, has produced many interesting and beneficial results. His work in the organization has revealed to the employer many sources of economic waste, and to the worker the unnecessary price he is paying for inattention to his health and the health of his family; while to the physician himself has been given a broader view of his social obligations and of the value of his services in creating and maintaining better living and working conditions among large numbers of persons of a fairly uniform social standing. Not the least of these advantages to the physician has been an increasing knowledge on his part of the true relation of the worker to his work, and a wider acquaintance with the fundamentals of business and industrial economics.

As health work became established in industry, certain definite problems arose for consideration. In order to provide a sound basis for action, counsel and discussion were felt necessary. To meet this need, particularly among the larger industrial centers of the eastern portion of the country, the Conference Board of Physicians in Industry was organized in 1914, and for the past eight years the best thought of this group of men has been centered upon medical and social problems of great importance to industry, and has influenced the policy and work of medical departments in industry.

During the industrial and business depression through which the country has just passed, there was ample opportunity for considering the value of various non-productive industrial activities, and the fact that the medical department in industry has retained its standing and importance to a relatively higher degree than have many other non-productive activities, is evidence of the value of this work. It is felt that with a revival of industrial activity, a statement of the functions, scope, accomplishments and possibilities of the work of the physician in industry will be timely, and it is with this purpose in view that the National Industrial Conference Board presents the group of papers composing this symposium.

The experience of the members of the Conference Board of Physicians in Industry entitles them to speak with authority, and in this symposium are discussed many of the problems encountered in medical work in industry. Each author has contributed of his experience. The collective experience of this

group forms a source of information rich in suggestion and fact, that should do much to identify and clarify the work of the physician in industry and to establish it as an integral and permanent part of the industrial organization. While the Conference Board of Physicians as a whole endorses this symposium, it must be understood that each writer has discussed his subject from his own viewpoint, and that all controversial statements are personal opinions of the writers.

It has seemed fitting that in this symposium there should be reference to the value of the work of the physician in industry from the viewpoint of industrial management, and the concluding chapter is devoted to a discussion of this question.

The membership of the Conference Board of Physicians in Industry is composed of the following medical directors of industrial corporations:

- Dr. E. B. ALLEN, Cheney Bros., South Manchester, Conn.
- Dr. T. JOHN BOWES, Philadelphia Electric Co., Philadelphia, Pa.
- Dr. W. IRVING CLARK, Norton Company, Worcester, Mass.
- Dr. ROYAL S. COPELAND, Consolidated Gas Co., Commissioner of Health, New York City.
- Dr. R. P. CUMMINS, Midvale Steel Co., Philadelphia, Pa.
- Dr. WM. J. CURRY, American Thread Co., Holyoke, Mass.
- Dr. W. B. FISK, International Harvester Co., Chicago, Ill.
- Dr. C. E. FORD, General Chemical Co., New York.
- Dr. OTTO P. GEIER, Cincinnati Milling Machine Co., Cincinnati, Ohio.
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- Dr. S. M. McCURDY, Youngstown Sheet and Tube Co., Youngstown, Ohio.
- Dr. J. D. MCGOWAN, Commonwealth Edison Co., Chicago, Ill.
- Dr. JOHN J. MOORHEAD, Professor of Surgery, Post Graduate Medical School and Hospital, New York City.
- Dr. VOYLE A. PAUL, The Yale & Towne Manufacturing Co., Stamford, Conn.
- Dr. R. S. QUINBY, Hood Rubber Co., Watertown, Mass.
- Dr. W. E. RAMSAY, Raritan Copper Works, Perth Amboy, N. J.
- Dr. WM. ALFRED SAWYER, Eastman Kodak Co., Rochester, N. Y.
- Dr. F. E. SCHUBMEHL, General Electric Co., West Lynn, Mass.
- Dr. LOYAL A. SHOUDY, Bethlehem Steel Co., Bethlehem, Pa.
- Dr. A. K. SMITH, E. I. duPont de Nemours & Co., Wilmington, Del.
- Dr. PAUL TRAUB, John Roebbling's Sons & Co., Roebbling, N. J.
- Dr. C. H. WATSON, American Telephone & Telegraph Co., New York.
- Dr. JOHN WOODMAN, United Electric Light and Power Co., New York.

Dr. C. C. Burlingame, New York, formerly of Cheney Brothers, South Manchester, Conn., and Dr. C. A. Lauffer,

Wilkinsburg, Pa., formerly of Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa., have been retained as members in the Conference Board of Physicians, although they are not now actively engaged in industrial work.

The officers of the Conference Board of Physicians in Industry are:

- Chairman.....Dr. JOHN J. MOORHEAD
- Vice-Chairman.....Dr. W. IRVING CLARK
- Treasurer.....Mr. M. W. ALEXANDER
- Secretary.....Dr. F. L. RECTOR, National Industrial Conference Board, New York City.

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The Physician in Industry:

A Symposium

INTRODUCTION

John J. Moorhead, M. D.

Chairman, Conference Board of Physicians in Industry, New York City

For many years it has been the custom of railway, mining, lumber and other industries to employ physicians to care for injured and sick employees. This medical supervision became imperative when industries were located in districts more or less remote; indeed, in some instances the medical aid thus provided by an industry was the only available source of such aid for a considerable territory. The service rendered proved so valuable in keeping employees fit that gradually it was extended to provide for large groups of workers, so that by 1914 many physicians were giving a part or all of their time to industrial work.

It was soon recognized that the physician in industry was engaged in helping to solve the health problems of large communities. In many instances his sphere of influence extended outside the plant and reached into the homes of the employees, providing for many groups the necessary guidance for such emergencies as accidents and epidemics and occasionally for the ordinary visitations of sickness.

The need for standardizing the procedure and coordinating the efforts of this type of medical practice soon became apparent, and out of this need in April, 1914 grew the Conference Board of Physicians in Industry.

This Board was organized for cooperative effort in introducing into industrial establishments the most effective measures for the treatment of injuries or ailments of employees; for promoting sanitary conditions in workshops; and for prevention of industrial diseases. The membership of the Board is made up of physicians and surgeons engaged in the clinical and administrative phases of medical work as related to the care of groups of employees. Bi-monthly meetings of a day's session each are held in New York City, and at these meetings common problems have been discussed, procedure has been standardized, and efforts have been coordinated to the end that the medical service given may be improved, thus benefiting employee and employer alike.

At first the curative side of the problem was discussed, and later the preventive side, so that at present attention is being directed not only to the care of the injured and the sick, but also to such intimately related problems as sanitation and hygiene.

Very early in the work of the organization standardization was agreed upon in relation to the means to be employed by laymen in giving first aid. Next followed the preparation of standard first-aid outfits and the proper equipment of first-aid rooms. Then a standardized form of pre-employment physical examination was decided upon. In this an attempt was made to fit the employee to the job on the basis that no one should be debarred from employment on physical grounds, unless a menace to himself, to fellow employees or to property.

Physical examination record charts were standardized, outlining in regional form a simple, speedy and inclusive method of conducting a physical examination and classifying the findings. The impetus given by war experience to the necessity for physical examination brought this phase of industrial medical work into prominence, and made the classification already agreed upon by the Conference Board of Physicians in Industry almost a national standard. The examinations for military service made a classification known as "A," "B," and "C," and a similar agreed-upon rating is a part of the standard plan employed by this group of physicians. It is well known, for example, that a specified form of heart disease renders an individual incapable of certain forms of work without becoming a menace to himself, to fellow employees and to property. However, that individual, even though not in "Class A," can be fitted to some job in "Class B," or "Class C." This is the purpose of such a classification. Such an arrangement prolongs the usefulness of the individual to himself and to industry. Incidentally, a proper physical examination gives the individual an estimate of his own physical capacity; it points out defects and suggests needed caution.

In time the process of physical re-examination at stated intervals will be recognized as a necessary work of medical engineering, just as essential as the re-inspection of any other kind of machinery to prevent breakdown or shutdown.

The exact position or function of a physician doing industrial work is dependent upon many factors related to the industry itself, to the type of employee, and to the location of the plant. In an attempt to define these limits of specialized medical practice, and to identify this type of specialist, the Conference Board of Physicians in Industry has formulated the following definition:

"The physician in industry is one who applies the principles of modern medicine and surgery to the industrial worker, sick or well, supplementing the remedial agencies of medicine by the sound applica-

tion of hygiene, sanitation and accident prevention; and who, in addition, has an adequate and cooperative appreciation of the social economic and administrative problems and responsibilities of industry in its relation to society."

The membership of the organization now comprises twenty-nine physicians devoting all or a major part of their time to industrial practice. The writer retains a position in the group virtually as an adviser on general surgical or clinical procedures. This group is responsible for the care of about 400,000 workers in varied industries. Similar organizations established for like purposes have been formed in various sections of the country, and it is hoped that eventually some centralized grouping will be formed for a combined annual convention.

Aside from the preceding tangible improvements in clinical service and administrative procedure accomplished by the Conference Board of Physicians in Industry, there are other specific results growing out of this organization of physicians. The general health of the worker has been benefited, his physical fitness has been ascertained and recorded, and any departures therefrom become a matter of knowledge to the same physicians who originally examined him. A record of this sort is much like the "history card" of a private physician, and has equal value.

The study and prevention of industrial diseases and hazards is an important consequence of this grouping, the results of these studies leading to improved sanitation and bettered working conditions. A healthy employee is a better employee, for with a healthy mind in a healthy body he progresses to his own advantage and to that of his employer.

Loss of time from accident and illness is a drain on the employee and on industry; a full-time job is possible only if the machine, human or mechanical, is geared to do full-time work. Changing employees is expensive for employer and employed, and the healthy employee works so well that he and his employer are better satisfied one with the other. No man can work at a job if he is sick in body or mind, and the physician in industry has a unique opportunity of proving that the medical engineer is an essential element in industry.

Finally, the Conference Board of Physicians in Industry acts as adviser in medical matters to the National Industrial Conference Board and provides for that organization information bearing upon the latest phases of industrial medicine and surgery.

THE PHYSICIAN IN INDUSTRY

C. C. Burlingame, M. D.

Joint Administrative Board of Columbia University and Presbyterian Hospital in the City of New York, and formerly of Cheney Brothers, South Manchester, Connecticut

With the ushering in of business depression there began in industry an ushering out of everything that could not demonstrate that it was necessary or essential in the field of production. All kinds of fads had found their way into industry when profits were swollen, and it was sometimes a question of whether to pay the Government excess profits taxes or try some new industrial experiment. But now every person in the whole industrial fabric was called upon to state "who he was," "what he was," and "what he had accomplished."

Among others, the industrial physician was called upon for an accounting. Unfortunately, as a group, they themselves were not quite sure as to "what they were"—were a little bit indefinite about "why they were," and at times rather vague on the question of just "what they had accomplished." Turning to industry, they asked "what they were," but industry in general had not given sufficient thought to be able to answer. Then the industrial physicians called upon the medical profession to tell them "what they were." Instead of receiving the hoped-for answer that industrial medicine was the new specialty in medicine and surgery, from some quarters it was heard, "Industrial physician? There is no such thing." Then they turned to society and asked "what they were," and again found that society had not given them enough thought to really classify them and give them any definite place in the scheme of things. So, it seems that it took the industrial depression to force the industrial physicians as a group to take an accounting of themselves and crystallize the answers to these questions.

What is an industrial physician? Is he a specialist in medicine or surgery in the same sense that the eye, ear, nose and throat man is a specialist, or the traumatic man is a specialist? He certainly has not been able to convince the medical profession of this. And, I believe, rightly so. He has only made such contributions as it is quite right to expect any progressive physician to make to his profession. Some industrial physicians, it is true, have become specialists in traumatic surgery, others in eye conditions, etc., but is there any fundamental difference in the treatment of a trauma sustained in industry and that resulting from a street car accident, or is good refraction and

eye work among industrial cases different from good eye work practiced upon workmen by other than industrial physicians? Certainly not.

I think we can safely dismiss from our minds the claim of the physician in industry to being a specialist because of any peculiar medical knowledge. But all are convinced that there is a difference between the man in industry and the medical man who has no such attachments. It has become very clear that the things which make the physician in industry different are chiefly, if not exclusively, the non-medical things.

To me it has seemed that our claim to recognition as a distinctive group of people serving society lay in the fact that we possessed, in addition to medical and surgical knowledge, first, a working appreciation of the economic, the administrative, and the social responsibilities and problems of industry; and second, the ability to make sound applications of modern principles of hygiene and sanitation. Lack of the first left the industrial physician individualistic and non-cooperative within an industry; lack of the second left him incapable of intensive practice of preventive medicine, his great opportunity of saving industry the waste incident to accident and disease. It was these things which made him distinctive. It was the lack of this knowledge which handicapped the new medical man coming into the industrial field; it was the lack of this type of knowledge which made it impossible for the general practitioner or the outside specialist to do the industrial physician's job as effectively as he himself was able to do it.

Let us then consider that the answer to the question: "What is an industrial physician?" is that "the physician in industry is one who applies the principles of modern medicine and surgery to the industrial worker, sick or well, supplementing the remedial agencies of medicine by the sound application of hygiene, sanitation and accident prevention; and who, in addition, has an adequate and cooperative appreciation of the social, economic and administrative problems and responsibilities of industry in its relation to society."

The questions as to why the industrial physician exists and what he has accomplished will be discussed in detail in the papers which are to follow. But if we take the foregoing definition of an industrial physician and study the elements which go into the making up of his non-medical self, we shall gain a broad idea of his field of usefulness in industry. I am presupposing that the training in preventive medicine which is now offered in medical schools and schools of public health is adequate and that he needs only to apply this knowledge intensively to each specific industry.

Those of us who have been most closely in touch with the practical side of industrial medicine are convinced of the necessity of analyzing the non-medical side of industrial work as

essential in fitting medical men for such work. An analysis of the non-medical side suggests that this part of a physician's training is no different from that which should be given to other industrial administrative groups.

The assistance of the New England Conference of Industrial Physicians was requested in making an analysis of the non-medical side of the work of the industrial physician. Their replies were analyzed and divided into three groups according to the people who might be interested in each branch of training. The result of this study is appended hereto, not as a final summary of the non-medical things which the industrial physician should know, but rather as a presentation of an idea which may or may not be worthy of further thought and elaboration. In presenting these groups, it is presupposed that the physician enters upon his duties trained in medicine and surgery and fully capable of practising preventive medicine.

GROUP I

Specialized Professional Knowledge

Under this heading would be such things as:

1. The technique of industrial physical examination;
2. Industrial first aid training;
3. Occupational health hazards;
4. Rehabilitation within industry;
5. Occupational surveys;
6. Illumination and ventilation;
7. Application in industry of medical ethics.

These are samples of one group of subjects which might not only be taught to the full-time physician, but might prove interesting to any of the following, in the aggregate, a considerable clientele:

- (a) Full time executive physician;
- (b) Full time assistant physician;
- (c) So-called part-time physician;
- (d) General practitioner doing industrial work on call;
- (e) Executive nurses in industry;
- (f) Assistant nurses in industry.

It is not contemplated that the industrial physician or the industrial nurse should be given detailed courses in illumination and ventilation, or in methods of making occupational surveys, etc., but they should have some training along these lines.

GROUP II

Organization and Functions of Medicine in Industry

Under this heading would be taught such things as:

1. The industrial dispensary—its organization, equipment and technique;

2. Industrial medical records;
3. Visiting nursing service;
4. Budget preparation and business administration.

This group would be of interest to the same clientele as are concerned with Group I, and in addition, this knowledge should, to a large extent, be imparted to:

- (a) Industrial relations managers, particularly physicians occupying such positions;
- (b) Employment managers;
- (c) The business executives responsible for supervising medical departments.

GROUP III

The Aims of Industry and Its Relation to Society

Under this heading might be taught such things as:

1. The purpose and place of industry in society;
2. The theory and practical application of compensation laws;
3. State laws relating to working conditions;
4. Organization of industrial plants;
5. Employee training methods;
6. Health laws applied to industry.

This group would be of especial interest to:

- (a) The full-time executive physician;
- (b) The part-time executive physician;
- (c) The executive industrial nurse;
- (d) Employment managers generally.

It is still an open question as to whether or not a sufficient number of people can be interested to make it worth while for an educational institution to undertake the teaching of subjects such as have been described in the foregoing groups. It is also possibly a question as to whether or not a university can present these subjects in a sufficiently broad and practical manner. But it might be well for us more carefully and completely to develop this list of headings in order that it may be made available for those who, in the absence of any organized courses, desire to undertake self-education. This would at least furnish them with some suggestions as to the directions in which they could best expend their energy.

Because of the uncertainty of employment, as demonstrated during this period of depression, there is considerable doubt as to the extent to which industry will attract the better men to full-time industrial medical positions. The full-time physician finds his employment too dependent upon the prosperity of some particular concern, and he can ill afford to take the chance of being forced to develop a new practice after having devoted the major part of his career to an industry.

No matter what may be the fate of industrial medicine as regards the full-time man, medicine will have to be practiced

in and for the benefit of industry, and, if that is the case, the necessity will still exist for training men along the lines enumerated in these three groups. We, as physicians, therefore, must feel our responsibility for impressing upon the men in private practice that they are responsible in no small measure for solving industry's health problems, and that, in order to do this intelligently, they must acquire industrial and economic points of view. The great need, therefore, is to have the general practitioner and the part-time industrial physician appreciate that they have much to learn in the non-medical field, and in the practice of preventive medicine, and that until they do this their responsibility to society cannot be met.

It is hoped that the men in private practice and the medical problems of industry may be brought closely enough together so that there will be no longer a distinction between the comparatively small group of men giving their entire time to industry and the mass of general practitioners who, to a large extent, bear the same responsibility, due to the fact that they are handling the sick and injured received from industry.

In the foregoing I have attempted to convey the impression—

First: That the industrial physician is in reality a physician in industry;

Second: That the physician in industry is differentiated as a specialist because of non-medical knowledge and his application in industry of preventive medicine;

Third: That it is doubtful if there is sufficient demand for the full-time man to warrant exhaustive study as to how to train him;

Fourth: That many of the non-medical things which he ought to know should also be known by a large group of specialists and general practitioners in order that the latter may fully meet their responsibilities; and

Fifth: I hoped to convey the impression that the great mass of industrial medical and surgical work, and the bulk of the responsibility must rest eventually with the profession as a whole—not with any small, selected, specialized coterie of medical men.

THE PHYSICIAN IN INDUSTRY AND HIS RELATION TO COMMUNITY PROBLEMS

C. E. Ford, M. D.

General Chemical Company, New York City

The value of medical service in industry was emphasized when state compensation laws, which rendered it compulsory to provide medical and surgical treatment for injured workers, became effective. Medical and surgical preventive work demonstrated that early attention to trivial accidents and injuries reduced the amount of time lost from work. Further experience showed that improved working conditions notably reduced absenteeism among employees. It also showed that conditions inimical to the health of workers could be removed with the assurance that their general physical and mental health would be benefited, resulting in increased production and lessened turnover, besides fulfilling important humanitarian considerations.

The importance of the foregoing will become amplified through the adoption of laws providing compensation for industrial diseases. The States of New Hampshire, Ohio, Massachusetts, Minnesota, California, New York, Wisconsin and Connecticut have adopted such legislation, and there are indications that other industrial states will rapidly follow their example.

The work of a plant physician should reach all departments and all activities of the organization. The physician who limits his activities to the plant dispensary is found to be relatively of little value to the industry with which he is associated. It is only as his influence reaches into the operating departments that the fullest measure of his service is realized. Co-existent with his curative and preventive activities should be a desire to see that men are placed at work for which they are physically qualified. The only method of obtaining this end is through the physical examination of workers and applicants for employment, to determine not only the applicant's physical condition but his mental attitude as well. His reaction toward industry in general and particularly toward the job he seeks can be gauged with a fair degree of accuracy in connection with the physical examination.

The study of processes and job requirements brings to light the degree of hazard present in different operations and suggests protective measures to meet each situation. Of course, certain hazards will remain concealed until cases of accident or illness bring them sharply to the attention of the superintendent through the medical department, but it has been found

that most of these, especially those of major character, are revealed when exhaustive studies of plant processes are carried on from the viewpoint of the plant dispensary. Given a physician or staff with experience and discretion and with the best interest of the employer and employed in mind, physical examinations are so conducted that rejections and recommendations incur little or no criticism. Rejections in many plants are based on the following:

Organic disease—including uncompensated heart disease, disease of the circulatory system, stomach, liver, kidneys, etc.

Loss of or defective vision.

Deafness or disease of the ears likely to lead thereto.

Disease of the nervous system.

Hernia, unless operated upon or unless the company is released from legal responsibility.

Communicable disease.

Amputations.

Defective mentality.

Candidates should be classified as follows:

1. Individuals physically and mentally fit for any job.
2. Individuals physically fit for any employment but below par in development or by reason of minor defect, who by treatment may be placed in Class 1.
3. Individuals fit for limited employment when certified to by plant physician.
4. Individuals unfit for any employment.

It should be made clear to candidates that the physical examination is not designed to eliminate the defective unless dangerous to the organization, but rather to lead him to remedy his defects for the benefit of himself and the company.

Notwithstanding this broad justification for the existence of the industrial physician as such (a misnomer, by the way) the question has been raised and debated as to the status of the physician in industry. Certain eminent authorities active in association work as well as in universities have dismissed the suggestion that industrial medicine or surgery is a distinct specialty, with the assertion that industrial medicine and surgery is nothing but good medicine and surgery in industry.

It is conceded that nothing short of the very best trained men have any right in the field. It is contended, however, that the very group of high authorities who have denied the industrial physician the right of special grouping and recognition, have failed signally in giving to industrialists, whether employer or employed, that prolonged period of economic productivity which special knowledge and responsibility places upon a physician in industry. They have not contributed to the study of hazards of the occupation, they have not studied processes, nor have they investigated the various operations, the mechanical appliances or the working environment, subjects

fundamentally related to good medicine and surgery. In many instances these men were lacking in knowledge of the nature of the product of the plant.

Was it the general surgeon or industrial medicine as represented through its personnel that recognized the opportunity for the rehabilitation of the disabled and crippled soldier? It was the physician in industry, familiar with the enormous wastage of man power, much of which can be charged to the general surgeon in his neglect of physical reconstruction and vocational retraining methods, that created this new field of social service.

Corporations have realized that they were shortsighted in providing medical service of the sort that disregarded the economic, social, educational, political and even moral phases of the worker's life.

Industrial medicine is not simply a field for the ordinary practice of general medicine and surgery, but bears the same relationship to medicine and surgery as does the specialty of gynecological surgery, or brain surgery, with their topical limitations, or traumatic or military surgery, with its special pathology, and, as Legge has well stated:¹

"The scope of application of industrial medicine is to the larger group as a unit and it is in this relation that the main endeavors are directed; although individual service is rendered as occasion demands, its special purpose is prevention—the prevention of occupational diseases and accidents. When these two main issues are applied to the whole group, the humanizing of industry is obtained and a crowning victory for society accomplished. To secure the maximum efficiency from the human machine, the industrial surgeon, virtually the human engineer, acts as the agent for stabilizing labor, thereby facilitating production and helping the worker to do a better day's work, prolong the years of his activity and increase his compensation."

The skeptic may see in industrial medicine elements subversive to the best interests of the profession—"socialized medicine," the health insurance fetish or what not. There is, however, less danger of exploitation, by faddists, of groups such as ours, which is gradually acquiring a business training, if only by contact and absorption, than of the profession at large with its isolation from affairs.

It is true that we physicians have been remiss in our communal and business obligations. There has been, unfortunately, a dearth of medical statesmanship and business capacity. The present day is intolerant of isolation from affairs. With others the physician must become active, and not only support and actively direct, but create remedies for those ills of society with which he is or should be familiar. Unless medicine does this and makes apparent its group strength before the people, the people all too frequently will be victimized by the various cults

¹Legge, R. T., "Industrial Medicine." *California State Journal of Medicine*. Vol. 19, No. 2, Feb., 1921, p. 64.

and pseudo-medical interests that quickly grasp the value of public influence, especially through legislative and governmental action.

The physician who accepts industrial employment merely to run a dispensary for emergency service, or to fill his wards for teaching purposes, or to protect the interests of the employer in case of liability claims, can hardly be an industrial physician in the strict sense. The greatest shortcoming on the part of the physician in industry from a strictly medical viewpoint is his neglect of research. Investigation and inspection of plants disclose innumerable opportunities for saving measures in illimitable variety.

The study of industrial physiology is a phase of our work neglected by all of us with a few notable exceptions. Industrial physiology has two objects:

1. The purely scientific one of ascertaining how the worker performs his work, the conditions under which he can produce most advantageously, and maintain bodily health;

2. The more practical object of establishing in industry the conditions that are conducive to the maximum output of the plant and the maintenance of the highest power of the worker.

To meet the present-day requirements of the physician in industry, medical director, or however he may be characterized, it seems that the following qualifications are essential:

He should be a man of good general education, possessed of honesty, tact and judgment. He must have had a sound training in the fundamentals of his profession, a general hospital training of not less than two years, with special attention to general medicine and surgery. He should have had at least five years of general practice. The future industrial physician should maintain a connection with public health agencies, such as the city health department with its various dispensaries, the general dispensary, and other public medical services, in order to develop the social viewpoint as well as to broaden professional skill.

The industrial physician should have a knowledge, not necessarily profound, of the fundamentals of industrial relations, including employment methods, labor turnover, job analysis, apprenticeship training, follow-up work among new employees, pensions, insurance, rest periods, absenteeism and general welfare problems.

He should have a general knowledge of physical working conditions, accident prevention, disagreeable gases and dusts, heating, lighting, ventilation, locker rooms, toilets, wash rooms, rest rooms, restaurants, water supply, plant beautification, etc.

A knowledge of housing conditions, transportation, general education facilities and other problems, together with the relation of the cost of living to local conditions, is essential. First-hand knowledge of the best methods of rehabilitating indus-

trially handicapped workers is also a necessity, and the advice of the physician on questions of recreational and social activities is desirable.

As Meredith has recently pointed out,¹ it is time the physician realized his concern in the normal human being as well as the sick human being, and that his ideal should be the human body always well and his shame the human body sick. It must be realized that the problem of health, like disease, is a medical problem, and that if we have a responsibility to the sick, our responsibility is none the less to the well. We in industrial medicine are seriously at fault in not devoting more attention to increasing our knowledge of the conditions of health.

The relationship of the medical department to the organization is a question that is of concern to all of us. Too frequently the activities of the medical department are under the direction of a personnel manager who is totally lacking in human understanding, and unappreciative of the finer confidential relationships of doctor and patient. Until a group of personnel managers is trained or until industrial relations are recognized as having sufficient importance to merit the attention of a high executive, I am definitely of the opinion that the medical department should be under the direction of and answerable to the highest executive possible. This opinion is not based on a desire to set up a false plane of authority or an intellectual aristocracy, but on the observation that many employment managers, through a lack of understanding of the medical viewpoint, have seriously interfered with measures designed solely for the benefit of the worker and the employer. This form of organization may not be in accord with the theory of scientific business organization, but it is of no inconsiderable practical value. This matter has recently been drawn to the attention of the National Industrial Conference Board, with evident interest and some assurance that the suggestion would have consideration.

With respect to the relationship of the physician or medical department in industry to other health agencies, whether maintained by the government or private organizations, probably the greatest opportunity for the promotion of the public health has arisen through the rapid development in industry of medical or health departments. Industry is the chief basis for the subsistence of civilized peoples. The maintenance of healthy industries is the state's first duty, because those who are employed in industry are a part of the community for which the state is responsible. The state has to consider how the conditions of life necessitated by industry affect the workers. Furthermore, the success of industries must depend in no small measure on the health of the workers, for the pro-

¹Meredith, Florence. "Physicians and Health." *The Survey*, Feb. 14, 1920, p. 577.

ductive labor of unhealthy workers is inferior to that of healthy workers.

A health department, either of a factory or community, when functioning properly must reach more or less directly every person within its jurisdiction. The past generation has witnessed radical changes in the theory of preventive medicine. Health officials are no longer permitted merely to meet emergencies as they arise. Health promotion has become more important than disease prevention, and disease prevention has come to be regarded as more important than disease suppression. The archaic policy of acting only in an emergency, of merely being ready to make the best of a bad situation, of repairing damage after it has occurred, has been relegated to the less enlightened past.

The success or failure of any movement for the benefit of public health depends to a considerable extent upon the attitude of the medical profession. In the main that attitude is sympathetic and encouraging. However, there have been measures of very decided public value that have been so strongly opposed by physicians that their value has been lost to the community. Unfortunately, the canons of the medical profession provide that the first duty of the practicing physician is to the individual, whereas in the practice of preventive medicine, the first duty is to the public. The individual doctor is so occupied with a specific case that he all too frequently permits others to direct the social, economic, and professional adjustments that modern progress has made necessary. These adjustments, despite the fact that the professional interests and those of the public are identical, should be made and applied by socially minded medical leadership.

Science has developed facts that have afforded remarkable opportunity to progress, and in so doing serious obligations have been imposed upon the physician. Changes in health administration have at times been radical, perhaps revolutionary, but no more radical and no more revolutionary than the changes that scientific progress has made necessary.

There is one phase of the relationship of the physician, whether in private practice or employed by the industrial organization, which may conflict with medical ethics as now understood, namely, the right of the employer to so-called privileged information regarding the physical condition of his employees. Medical departments in industry should function for the mutual benefit of the employer and employed, but the confidential relationship of physician and patient should be recognized in all cases. Certain facts obtained by the physician in his examination of the worker may affect adversely the interests of the employer or the public, but by assuming the responsibility of either eliminating the undesirable worker from the factory or arranging his work so that in his continued em-

ployment he does not constitute a danger to himself, to his fellow workers, or to the employer's property, the physician can still respect the confidence of the worker and safeguard the interests of the employer and the public.

Industrial medicine and surgery is in fact a form of group practice, a modern creation which endeavors to bring together all of the arts and sciences which bear upon human welfare. It differs from other practices chiefly in organization, which insures coordination of effort, in records based upon scientific findings, and in a provision for adequate written reports considered from professional, legal and economic points of view.

Advanced thinkers now believe that industrial medicine, on account of its influence on the profession and upon hospital equipment and other facilities, should be given a place as a major department in hospital organization.

In conclusion: However broad the medical service in a given plant may be, or whatever support and sympathy the management may have for the medical department, the department must "sell itself" to the individual employee, and build up confidence, exactly as does the private practitioner in his relation to the public.

THE MEDICAL DEPARTMENT IN INDUSTRY

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ORGANIZATION

In the organization of the medical department in industry, account should be taken of certain fundamental requirements. An efficient and satisfactory department can seldom be established and developed without adequate personnel—adequate both in quality and quantity. The head of the department must originate such a flow of sincerity of purpose, both in his own attitude and in the selection of each assistant, as will surely inspire the confidence of employer and employee, and warrant their faith and support; for the real success of this work must be built on the confidence and good will of the worker and employer. Nurses and other assistants should be selected with the importance of the right personality in mind.

It is always preferable to have a nurse working under the supervision of a physician, but where this is not possible, the nurse should be restricted to service within the bounds of her profession. All too often nurses constitute the entire medical department, there being no physician in attendance. A few employers have learned that it is costly economy for a nurse to do work beyond her recognized ability, legally or professionally.

Another factor in the development of the work of the medical department in industry is the avoidance on the part of the physician of too much individuality. He should make every effort to build along lines of cooperation and interest, from the higher executives down through his own staff to the rank and file at the bench and machine. Cooperation given at the inception of the work of the department is of value whatever the amount, and that which is not given freely must be won through both word and deed.

COOPERATION

It is essential that the management have a real interest in, and intelligent appreciation of, the medical department. It is equally essential that other departments in the organization whose work and sphere of service are so closely allied with that of the medical department should be won over to cooperation. There can be no doubt of the inter-relationship of medical and employment departments. They should work together most harmoniously and intimately. Such problems as the physical examination of applicants for employment, the transfer of employees from one job to another, retirement, absence because of

sickness, and the like, are joint affairs, and can be successfully worked out only by a complete and thorough understanding of and respect for the functions of each department.

Cooperation with the safety department is equally important. Usually the medical department's first contact with the safety department comes after the accident has occurred, but here very often is where accident prevention should begin. The physician and nurse can, and often do, secure information that is of the greatest importance in the prevention of future accidents. Further, there is often the opportunity and necessity for teaching first aid, thus enabling employees to care for those injured until nurses or physicians are available. This gap between the time of occurrence of an accident and its treatment by a properly authorized person is often neglected, resulting in much lost time by injured workers.

Sanitary inspections of service and working conditions should be made conjointly by the safety and medical departments. Matters affecting health and safety are so closely allied and often so overlap, that greater results can be accomplished by the two departments working together on such matters than when working separately.

QUARTERS AND EQUIPMENT

A medical department must be given sufficient space. Good work may be done in a corner, but the best work is more probable with commodious quarters. That these quarters must be clean, sanitary and businesslike, contain the necessary equipment, and provide privacy with a bit of cheerfulness thrown in, goes without saying. There is a definite reaction of no mean value to be derived from the atmosphere of a room equipped with furnishings which bear the stamp of quality and efficiency.

There are three chief types of arrangement of quarters. First, the single room, be it large or small, wherein workers are treated for all ailments developed while on duty. This is the most common type, and contains equipment sufficient to meet the needs of the work in hand. While this type of arrangement is almost always seen in plants where a trained nurse or an attendant only is in charge, it is also found in some large plants where much work is done. In the larger plants supply and dressing tables are usually mounted on wheels so as to be readily available in any part of the room. This arrangement is confined to the dispensary proper, the physician's private office and quarters for special work being provided elsewhere.

The second type of dispensary consists of one or more large rooms with the equipment disposed in small units for treatment of eye, nose and throat infections, for general dressings, emergency illness, etc. No privacy is attempted, but efficiency and safety are aimed at. Here the equipment is limited, though

adequate and practical for the work to be done. The administration of a dispensary equipped in such manner is, of course, under the supervision of a physician. Often physical examinations are performed in a room adjoining or near the employment department, and provided with one or more disrobing booths.

The third type of arrangement is that in which every attempt is made to give to patients the privacy and comfort found in a physician's private office. Here there are an adequately equipped office for each physician, or separate small rooms for the treatment of different conditions, waiting rooms, rest rooms, etc. This form of layout makes for good feeling on the part of the employee and enables the physician to consider each case most carefully, and, if the procedure is properly organized, provides as much if not more efficiency than does the one-room arrangement. Choice of arrangement of dispensary equipment depends largely upon the type of industry, whether treating one or both sexes, and whether it is introduced simply as legal protection or for real service. Further details of arrangement and equipment of industrial dispensaries can be found in Bulletin No. 99 of the U. S. Public Health Service, Washington, D. C.¹

FUNCTION OF THE MEDICAL DEPARTMENT

Medical work in industry potentially has a wide scope, depending largely upon the extent to which the management is convinced of its value, and the vision and leadership of the physician in charge. Industrial medical work should find its first and chief point of contact with the industry and the worker through the physical examination. This contact with the individual arouses, or should arouse, his interest in health. Without this interest the general health standard cannot be raised. Practically every one is concerned to some extent with his own health, and when defects or weaknesses are pointed out in a friendly and helpful way, the affected individual usually responds with interest and appreciation. Examination of applicants for work should disclose in each case whether such applicant is fit for the job for which he applies or whether he should be placed in a different type of employment because of some physical defect or weakness, or rejected if no suitable work is then available.

More and more is the effort being made to find work for all. Physical examinations of workers to be transferred to more hazardous or exacting jobs are frequently made. This often will prevent a future accident, or breakdown in health. Examinations of those long in the service of the company and who are about to be retired because of age or disability are frequently necessary. If a company has a retirement or pension plan it is well to know the exact physical condition of retiring employees,

¹U. S. Public Health Service. "Studies of the Medical and Surgical Care of Industrial Workers." Bulletin 99, 1919.

in order to deal fairly with them. In matters of leave of absence to regain lost health, examinations are often required to determine eligibility for sick allowance during the time absent. This question frequently arises with employees absent because of alleged sickness. Often the employee fails to make a distinction between illness and fatigue. Naturally physical examinations are sometimes required to determine to what extent employees are really ill.

In addition to examinations for the above conditions there should be a physical "checking up":

- (a) When an employee has an accident;
- (b) After a protracted absence due to a serious illness;
- (c) After frequent short absences due to slight indispositions;
- (d) When productivity falls below standard;
- (e) At the request of a department head who notices failing health.

Often it is the foreman or supervisor who first sees the early signs of disease;

(f) Periodically of executives and department heads, food handlers, and others. In this way the more subtle maladies are detected in their early stages when they can be checked. Few diseases or weaknesses are of sudden development; they usually start so gradually that their existence is long unsuspected. Occupational disease can also be guarded against by frequent surveys and examinations.

Aside from physical examinations, there is the caring for those injured while at work, treating these in plant or community hospitals or in their homes until they are fully restored to employment. This treatment is provided for in most states under workmen's compensation laws. Under this phase of medical work in industry comes rehabilitation of the injured or crippled worker to the end that he may be restored to full working capacity.

Along with the care of these injured is the treatment of those taken ill while at work. Such conditions as fainting, headaches, heart attacks, upset stomachs and the like must be cared for so that the worker may not be forced to go home and lose time. It is at all times the function of the medical department to keep the worker on the job. A medical department which can appreciably cut down time lost from sickness is one that can without question justify its existence.

A most important feature of the work of any physician in industry is the advice he gives regarding treatment by specialists, various forms of treatment, hospitals, and the like. To a large extent the medical department in industry is a "casualty clearing station," constantly referring employees to proper physicians and other remedial agencies.

Plant sanitation should come directly under the supervision of the medical department, and as stated previously, inspections of working conditions are often more successfully conducted in cooperation with the safety department.

Progressive employers are coming to see that the working place should be not only safe and healthy, but pleasant as well, for these things have a direct bearing upon working efficiency. Some of the more important conditions to observe in an inspection of the plant are the following:

- (a) General plant housekeeping, order and cleanliness. Cleanliness has a definite effect on workers. Dirty corners invite promiscuous spitting and other unwholesome practices. Dirt also holds moisture and favors the growth of bacteria;
- (b) Drinking water supply, particularly in regard to temperature and accessibility to workers;
- (c) Ventilation. An adequate supply of fresh air of proper temperature and humidity, with freedom from dust, and efficient exhaust systems where dust is a factor;
- (d) Illumination, natural and artificial;
- (e) Toilets, lockers, wash rooms, etc.;
- (f) Cuspidor service;
- (g) Proper drainage where wet processes are carried on;
- (h) Occupational health hazards;
- (i) In general, any condition unnatural to the physiological activities of the worker, especially posture and other fatigue-producing factors.

Industrial or factory hygiene is a definite part of public health. Many states have passed laws which provide minimum standards for the protection of workers. Sanitary codes and other measures of regulation are doing much to awaken the interest of both employers and workers in the value of improved working conditions that result in a decrease in ill health, and a more efficient working force.

Health education is vital in any program of sickness prevention. By means of talks, classes, bulletins, pamphlets, exhibits and articles in employees' magazines, much can be done to instruct and enlighten workers regarding ways to preserve their health. Health supervision falls short of its real purpose without this educational work.

EMPLOYEES' COMFORTS

The influence and advice of the medical department extends into employee welfare matters not directly under its control. Rest rooms, rest periods, lunch rooms and cafeterias, recreational activities, all need the help of the physician's knowledge. The physician is the expert on the human machine, and his opinion is valuable in making plans with respect to the above-mentioned activities. In some organizations, a half day's or whole day's absence is allowed all women employees on account of the menstrual period. In others no allowance is made. In some places the individual who suffers with dysmenorrhea is an unwelcome applicant for employment. In this matter the medical department plays an important part, for by proper supervision of such cases they can be retained as productive

units. Rest rooms which can be used at such times should always be provided for girls and women, preferably in conjunction with the medical department.

As regards rest periods during working hours, the medical department should make every investigation possible to determine the physiological necessity therefor, and the length and type of period. In some cases relaxation is indicated, in others raising all windows and indulging in a few simple "setting-up" exercises is best. With regard to employees' restaurants, the medical department should have a more important part in their management. In these days leaders in the medical profession have come to realize that in the right food is the real foundation for health, and a medical department that hopes to function to its fullest extent should do all it can to educate workers regarding proper nutrition.

The scope of medical work in industry is broadening to such an extent that in the future the title of health supervision, or medical and surgical supervision will fail to cover its multitudinous activities and the breadth of its field. Its work cannot be confined to the mere detection or prevention or amelioration of disease, and the prevention and treatment of accidents. It must be more than merely providing good light, water, air, heat, rest rooms, dispensaries and hospitals. It must take into account men at work, individually and collectively, with respect to natural bent, temperament, disposition, education, racial characteristics, habits, recreational needs, environment and even inheritance; in fact all things which bear on the social, economic and physiological sides of their lives.

PHYSICAL EXAMINATIONS: A RÉSUMÉ

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Industrial medicine has, of recent years, increased the scope of its activities, particularly in the field of physical examinations. In beginning medical work the majority of industrial organizations had in view, in addition to their primary object of first aid and care of accidents, the general question of the physical examination of the prospective employee. As industrial medicine has progressed, it has become apparent that the physical examination of the applicant is entirely inadequate from the standpoint of proper medical health supervision, and every well planned and successfully operated industrial medical plant must have an added function, namely, inspection of that human portion of the plant which it is planned to serve. The plant engineer, after passing upon the integrity of newly acquired equipment, periodically carries out an inspection to determine its efficiency, its rate of depreciation, and its relationship to the other portions of the plant with which it must coordinate its functions. The same logic applies to the human plant equipment. Hence the physical examination of the employee in all its phases.

In addition to this applicant and employee examination program, there is made necessary, as a result of accidents, the physical survey of employees who have been injured. This examination is not for the purpose of supplementing anything else, but is rather for the purpose of determining whether any known or unknown physical impairment may have been a factor in the production of the accident, a contributing cause in delay, or in the imperfection of the result. This physical examination of the injured employee, furthermore, should determine the degree of loss of function resulting from the accident as a basis on which the company may plan its program before the compensation commission.

Lastly, we reach the refined phase to which physical examinations can be carried, i. e., that of detailed study of employees suffering from conditions where the diagnosis is problematical and obscure. This latter phase is difficult to justify, and can be proven only in those organizations where the personnel is considerable and concentrated.

This gives us four concrete subheadings to the general theme of physical examinations:

1. Physical examination of applicants;
2. Periodic examination of employees;

3. Physical examination of accident cases;
4. Detailed examination of sickness cases for diagnostic purposes.

PHYSICAL EXAMINATION OF APPLICANTS

For the past few years the literature of industrial medicine has been crowded with excellent articles covering practically all phases of this problem. There is little or nothing to add except in the form of discussions as to refinements and technique.

Reasons for physical examination of applicants: No person who constitutes either a menace to himself, a menace to others, or a menace to property, should be considered acceptable for employment. In plant terms, such an individual is a hazard just as is an unbalanced flywheel with a defective governor.

Extent of the examination: The extent to which prospective employees should be submitted to physical examination naturally depends, in large part at least, on the type of industry in which they are to be engaged. There are special types of occupation where a more searching examination with respect to specific details is necessary, such as those where particular importance is attached to eyesight, hearing, or possible previous beginnings of industrial disease, as among certain metal and chemical workers; also those where the acme of physical perfection and endurance is required, such as engine drivers. There are, however, a few important requirements which should be common to all physical examinations. All applicant examinations should be so carried out that the elements in the physical field covered would enable the examiner to detect:

- (a) Active pulmonary tuberculosis;
- (b) Cardiac disease with potential or established decompensation;
- (c) Active or chronic venereal disease;
- (d) Acute contagious disease;
- (e) Chronic progressive disabling disease, such as Bright's and diabetes;
- (f) Potential and active focal infection;
- (g) Defective vision and hearing of a degree incompatible with the requirements of a given industry.

The amount of detail involved in the physical examination capable of eliciting evidences of the above-mentioned conditions may, as a result of experience and practice, become considerably limited. I believe that particular effort should be made, in the formulation of a standard physical examination plan, to bring out the fact that we are searching for a few cardinal points on which to pass judgment as to employment of an individual. In other words, it should be very definitely understood by the medical man entering industry that he is not carrying out a hospital, a dispensary, or even a private office examination of a patient. Industry cannot be called upon for a detailed physical survey of prospective employees to elicit both

major and minor impairments and finally to pass judgment on these in terms of employment or non-employment.

Once this method is in operation, it will be found that the average time consumed will not be prohibitive from the standpoint of costs. The maximum length of time for the physical examination of an applicant should not be more than fifteen minutes, and, in many instances, not over six or eight. Where the number of employees is large enough to justify it, prospective employees, after having been passed upon by the employment department officials, should be sent to a nurse who can prepare the preliminary findings, such as history elements, sight, hearing, tonsils, urinalysis, etc. It may be possible, upon submission of her findings to the physician, for him to judge as to the worthwhileness of consuming more time in examining a given applicant.

Findings of rejected applicants placed in hands of their physicians: In all instances where employees are rejected, the result of the examination, together with a recommendation as to the proper course to follow, should be placed either in the hands of the employee, if the condition is simple, or in the hands of the employee's physician if the condition is serious. This is an important public health service.

By whom the examination should be made: The determining physical survey of prospective employees should always be made by a physician. Many industries employ nurses for this purpose. This is a mistake, as an undue burden of responsibility is thrown on a person, who quite naturally, as the result of her training, has never had an opportunity of learning the fundamentals of a physical examination. True, she can be used for many of the preliminary tests, thus saving the time of a physician, but no nurse should be asked to determine the presence of tuberculosis, syphilis, acute infectious disease, and focal infection. It is false economy and a travesty on modern public health. The nurse has a very definite and important place in industry, but she is not there to take the place of the physician. There are enough things she can do, which the physician cannot do, because of lack of time, and even lack of ability.

Place of examination: The proper place for the physical examination should be within the company's own plant, not at certain hours in doctors' offices. Even in small plants the doctor can be brought on a reasonable fee basis to the plant to spend the necessary time on the examination and other duties as they arise. This is a definite part-time problem which is capable of being solved everywhere.

The place devoted to this work should be well chosen, where light, air and sunshine, together with a wholesome medical personnel, will give the employee a confidence that will go a long

way in building up morale. Employees should have pride and confidence in their own medical department.

PERIODIC EXAMINATION OF EMPLOYEES

Logically, physical examination of applicants should be followed by a periodic examination after employment. People are employed often in spite of minor impairments. These may be correctible or they may be progressive. All facts as to their correction or progression should be known. Likewise, new impairments and chronic, progressive, disabling disease may become evident at any time, in anyone. Their detection and the institution of suitable corrective régimes are necessary to maintain an employee in a working condition, without waiting for the advent of disability and absence from work to supervene before a routine is established. Periodic examination of employees can become quite detailed, but, like the physical examination of the applicant, the extent should be determined on the merits of each individual case, the results of the findings being put in proper form and placed in the hands of the employee's attending physician. The latter should in all instances have the responsibility of handling the case with such advice and cooperation as the plant medical facilities can afford.

PHYSICAL EXAMINATION OF ACCIDENT CASES

Practically every corporation, over and above its concern with regard to compensation payments in accident cases, desires that the disabled employee obtain the best and most complete restoration of function of the injured part. Too often, however, we find that the case is left in the hands of a well-meaning physician whose ability cannot be denied but whose breadth of experience has not been sufficient; whereas, if adequate counsel had been obtained to supplement his skill, better results could have been obtained. Generally speaking, by the time this additional counsel is obtained, the case has progressed over a sufficient period of time to make impossible a result comparable to what would have resulted from early supervision. In obtaining such examinations, if the industry has not adequate or available medical personnel, outside talent must be sought, it being borne in mind that definite information is to be obtained on the following points:

- (a) Venereal disease as an inhibiting factor;
- (b) The presence of chronic, progressive, disabling disease as an inhibiting factor;
- (c) Has the case been handled properly up to the time of examination?
- (d) What is necessary to hasten and obtain the best final result?

DETAILED EXAMINATION OF SICKNESS CASES FOR DIAGNOSTIC PURPOSES

This last subdivision is the extreme phase of the health supervision program. It is difficult to determine whether this is a proper charge against industry, but in large and small organizations alike, we see sickness cases which have excited interest on the part of management, and in which management has gone to the extreme in obtaining the right diagnosis and treatment. We see such instances occurring with growing frequency throughout industry, and it is but another evidence of the evolution through which this phase of industrial relationships is going. In other words, supervisory officials are beginning to appreciate what is rapidly becoming common knowledge, i.e., that it is a difficult and expensive thing to obtain adequate diagnosis. They have always wanted the correct solution of physical difficulties in their own mechanical plant equipment, and now they are beginning to want the correct solution with respect to physical difficulties in their own human plant equipment. Aside from that, we know there is a very definite humanitarian motive assuming larger and more practical dimensions. The executive with an adequate salary, having an obscure gastro-intestinal condition of his own investigated, is forced to wonder how one of his similarly afflicted employees is going to obtain the same kind of exhaustive study, without adequate financial means or intelligent knowledge as to how the best can be obtained.

In industries where the size of the plant is sufficient, such detailed examination can be made by the plant's own medical organization. This is ideal both from a personnel and from a practical standpoint. It means, however, a more elaborately equipped medical plant with the machinery for diagnosis, such as X-ray and laboratory facilities. As a matter of fact, the actual cost is small when compared with that of physical productive units. In smaller organizations, this type of personnel endeavor can be carried on by means of the part-time or fee plan with the medical talent available. In arranging for this sort of medical service, the best men should be approached, it being explained that industry cannot pay for such service in terms commensurate with those of the able-to-pay private patient. The physician should appreciate that of all the medical activities, this is the most altruistic; that the money return to the industry must of necessity be small, although the benefits in industrial relationships are large. Once the matter is put on this basis, the physician should and always is willing to cooperate on the adjustment of costs. He will recognize this as one of the most important advances in public health endeavor.

TRAINING FOR FIRST AID

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The term "first aid" should be used to include only the aid or assistance first rendered to an injured or sick worker. Because of the many kinds of injuries and sickness, and because of the various interpretations given to this work, the term "first aid" has been mishandled, abused and stretched to cover almost any form of help requiring varying periods of time. In industry first aid should include only such measures as insure life and comfort to an injured or sick worker until he can be cared for by the physician.

We are aware that prevention is better than cure, and that safety, health and first aid should go hand in hand. Safety and health are first aids in the prevention of accidents. An accident is "an undesigned and unforeseen occurrence of an afflictive or unfortunate character."¹ Personal accidents, accidents to the human machine, unforeseen, unfortunate, are the ones to which we desire to apply first aid. When an accident happens, and a worker is injured, it is a relief to know that someone is available who knows what to do, and does it, until the doctor comes. This is the first aid we want to teach.

"First aid means the immediate treatment of personal injuries by any one other than a doctor."² The term should not apply to any treatment other than first help to an injured person, and should not refer to those who do re-dressings and usurp the rôle of doctor and nurse without proper training. It should apply to those who learn how to do the work in order to help themselves and be of assistance to their fellow men. One of the greatest troubles to be overcome in the consideration of this question is the fact that first-aid manuals now in use teach too much, and tend toward producing would-be doctors and nurses, who forget the limits of their ability and enthusiastically undertake what they should not attempt to do. As has been said, it is wise to teach what not to do as well as what to do.

From an industrial standpoint it is well to combine the teaching of first aid with that of safety and accident prevention. If safety and accident prevention are carefully applied, the need of first aid is lessened. The personal health of the worker and his family and the public health can all be benefited through teaching the fundamentals of how to live.

¹Webster's Dictionary.

²National Safety Council School for Supervisors. Outline of Lecture on First Aid.

In the teaching of first aid and the training of first-aid workers, consider first whether few or many are to receive training. In the industrial plants I believe in training as many workers as possible. They are gathered together in small groups, by departments, if you choose, and taught as first-aid assistants, and not as doctors and nurses. In this teaching we keep away from medicines, solutions, and the like. The use of head and hand is far more important. If your groups are organized with definite place and time for instruction and the work is made interesting and clear, you will find in these meetings an opportunity to drive home lessons in safety and health that are of great importance to the worker and his job.

To stimulate interest in the work, especially in the large plants, plan a first-aid contest between teams of the various departments. Select a team of six men for each department, but do not allow these men to repeat year after year; get new men each year until all the men have been instructed in the principles of first aid. In the beginning select the men who express a desire for and show an interest in the work. They will be the leaders in the plant. They will help to popularize the work and you will have no trouble in recruiting teams another year. We believe in taking time from the day's work to teach men to care for themselves and others. Make the course worth while, and the little talks that reach home will do much toward making friends and loyal workers. Go over all the possible hazards and injuries of the department and be sure that the men understand them. In team training be sure that the men understand why they do things. The application of splints and pads, the tying of knots, proper positions, etc., must be the same for all the teams if they are to meet in contest. I believe in relating the teaching of first aid, safety and health to the men and to the plant.

In the training of teams, one man must be the leader, to take command, and each member must have his work to do. Teamwork wins, and the men must be trained to work as a unit. These contests are of value. They bring the men together, teach them to do the work under pressure, and to keep their heads. They really enjoy the work and the spirit of competition. At such meets I have seen teams aroused to a pitch equal to that of any athletic teams in competition. In our work the spirit of rivalry of the various department teams, and later of the inter-plant teams, extends from the men to the superintendents and general managers.

All first-aid teaching should be under the direction of the plant physician. There are four cardinal points to teach in first aid, the same wherever you meet them, and around these you may build as the work demands. These points are:

- "1. Shock—its symptoms and treatment;
2. Hemorrhage—how to control by direct pressure, seldom by tourniquet;
3. Asphyxia—its causes, symptoms and treatment; artificial respiration by the Shaeffer prone pressure method only;
4. Transportation—careful handling of the injured in a minimum of time, so as not to cause pain or further trauma, is one of the most important things taught first-aid classes."¹

If you begin with a simple story of the human body, the human machine, and briefly tell of the bones, vessels, nerves, etc., and of the wonderful interdependence of the parts, making for body teamwork, you will find the task easy and have a framework around which to build. It is a mistake to teach too much anatomy or physiology to the layman, or to teach him to do too many things. Confine the teaching to a few essentials; do this thoroughly, carefully drawing the line between what he ought to do and what he ought not to attempt.

I believe in teaching the simplest dressings and bandages. The work will vary somewhat, depending on the location of the plant, and will be guided by the time required to transport the injured to the hospital or for the doctor to arrive. In lumbering camps and in mines conditions may arise where you will deem it necessary that more be done, but in the teaching of first aid be ever mindful that too much knowledge may prove dangerous.

In the teaching of cause and treatment, do not give too many methods. The teaching of the application of splints and bandages may be included under transportation. I believe in teaching first aiders to use sterile dressings and to send the injured to the doctor or nurse. Teach them to keep fingers out of wounds and caution them as to infection. Infection, with its disastrous results, is one of the big things to drive home in all first-aid work. Overcome the old idea that some sort of medication is always a necessary adjunct to first aid. Training for real first aid, to reach the greatest number, is not the teaching or training of a "handy man" to tie up cuts, remove foreign bodies from eyes, etc. Of this I do not approve.

The dressing of wounds, boring of finger nails, picking of foreign bodies from eyes with hard objects, or the daubing of iodine on minor injuries, should be forbidden absolutely. I believe in the emergency clinic for this work, and in educating the workers to use it.

The care of the injured in shock, the control of hemorrhage, artificial respiration by the prone pressure method, and making the injured comfortable during transportation are the important things to teach. Conduct your first-aid course so that the men are taught health, safety, first aid and a feeling for their fellow men.

¹Shoudy and Colcord. "Standards of First Aid." Report of Committee of American Association of Industrial Physicians and Surgeons, 1922.

Teach prone pressure artificial respiration only, and be sure that your method is correct. This question is discussed thoroughly in a paper by Dr. C. A. Lauffer.¹ Overcome the exaggerated impressions as to the value of various mechanical devices sometimes used. Be mindful of the viewpoint of the worker as regards pain, and do something for its relief.

The value of first-aid training may not be apparent the first year. In some plants it may require two or three years to see results, and frequently the good is felt, rather than seen. The men who are trained have a common ground. Those of the department who have been through the work have not only built in safety and health, but in loyalty also. Properly conducted, the work is sure to have a bearing on the number of accidents. The frame of mind toward hazards, the ability to do something for the injured, will eventually show in the safety and hospital records of any plant where the work is properly conducted.

The lessons learned will help in the family life, will stimulate the man to new ideas as to health and sanitation, and will be pertinent to the teaching of men how to live as well as how to make a living.

¹"Resuscitation." Handbook issued by the Westinghouse Electric and Mfg. Co., 1913.

INDUSTRIAL MEDICAL RECORDS

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The question of need for industrial medical and surgical records may be approached and answered from three viewpoints: the legal, the economic and the scientific.

The legal demand for such records may be found in the compensation law requirements of the various states, and in the data necessary in the filing of replies to liability suits and claims. It appears that the amount of damages granted claimants is becoming progressively larger, and therefore, that the need for adequate medical records in dealing with such claims is becoming more imperative daily.

The economic requirements are innumerable. The amount of time lost through avoidable accidents, infections and illnesses, with the inevitable loss in production, in comparison with the cost of medical supervision, is of vital interest to any management. The wage loss due to these causes is of serious consequence to the employer as well as the employee. A knowledge of the actual amount of money paid to workers through insurance, compensation and beneficial funds, as well as of the possible reduction in the amount of these payments that may be made by efficient medical supervision, is a need which should be met as a simple matter of good business policy, and which can be filled only by complete records. The frequent requests made by government pension boards, fraternal and beneficial societies and other social service agencies without the plant, for records of treatment, makes the keeping of full records the only preventive of embarrassment on the part of the company dispensary, protecting both the employer and employee.

The scientific need for medical records is felt by insurance actuaries of old line companies, as well as by industrial managements that maintain self-insurance and beneficial funds. From complete surgical records insurance rates may be calculated, experience ratings may be granted and adequate and equitable costs fixed. Complete records will also frequently give data that warrant a decrease in premium on risks, more than sufficient to defray the entire cost of medical supervision; or again such records may show that the premium is inadequate. A complete record of treatments given to injured and sick employees, is of course necessary for reference of the attending physician. The results of his methods, technique and prescriptions are his guide for future treatment. From his record of cause and effect, he procures information necessary in making recommendations

regarding health and safety hazards. Broadly, the object of these records is to assist in maintaining the working force of an industrial organization at its highest possible physical efficiency, by supplying data to the attending physician, the management, the statistician, and the various agencies that tend to increase the worker's ability to work.

The minimum amount of data necessary on any sickness or surgical record will, of course, depend upon the scope and plan of the anticipated medical work, and the relation of the medical department to other departments in the organization—the latter in order that there may be no duplication of effort. All medical records should embody at least sufficient data for an intelligent full report, as required by the compensation board of the state in which the industry is situated. Enough medical and surgical data should be recorded to guide the physician in furnishing certificates and reports when requested. The minimum amount of information needed regarding cost and lost time on medical records will of course depend upon the amount of this data already on file in other departments of the industry. The minimum amount of information on a medical record would therefore be an approximation to the outline suggested by the committee of the American Association of Industrial Physicians and Surgeons, which is as follows:

ACCIDENT RECORDS

1. *Personal items*
(employment data)
 - Name and address
 - Shop number
 - Age
 - Sex
 - Race
 - Marital condition
2. *Plant items*
(occupational data)
 - Department
 - Foreman's name
 - Occupation
 - How long in employ
 - Physical examination classification
 - Were guards provided and in place
 - Could they be used
 - Cause
 - Mechanical or non-mechanical
3. *Scientific items*
 - Part of body injured
 - Nature and extent of injury
 - Treatment

MEDICAL RECORDS

1. *Personal items*
(employment data)
 - Name and address
 - Shop number
 - Age
 - Sex
 - Race
 - Marital condition
2. *Plant items*
(occupational data)
 - Department
 - Occupation
 - Previous occupation
3. *Scientific items*
 - Physical examination classification
 - Diagnosis

ACCIDENT RECORDS

4. *Economic items*

Amount of production time
lost
Amount of wages lost
Cost of physician, drug and
hospital expense
End result

MEDICAL RECORDS

4. *Economic items*

Amount of time lost
Amount of equivalent wages
lost
Cost of physician, drug and
hospital expense
Amount of compensation
paid
End result

Additional useful information will generally be found to be a product of evolution, based on special requirements of the plant in which the medical department is functioning. It is impossible to anticipate the total amount of this data. It will be added from time to time as the necessity for the information is felt, and made manifest by requests for information from various executives, departments, or other interested parties.

Witnesses to accidents should be named. The date, day and hour of occurrence should certainly be noted on all records. Nationality is always of interest and working conditions regarding health and accident hazards should of course be recorded. Cost analysis is of great importance. A survey of seventy-five accident record blanks from as many large and varied industries failed to show however, any provision for the recording of expense or estimated saving. But six accident record forms out of eighty-one submitted provided space for cost entry. This signifies either that expense items are taken care of by other departments, and that the plant dispensary does not have access to the figures, or that the industrial physician is not so keenly alive as he should be to the importance of these data.

Information on health education, sanitary surveys, nurses' activities, and plant hygiene, ultimately may find a place on medical records. The reports of eye, dental, X-ray and laboratory specialists may be made necessary by medical development. In addition to the above, information may be required for special health and accident hazards in special industries. An analysis of the medical blanks submitted by members of the Conference Board of Physicians in Industry and by the Philadelphia Association of Industrial Medicine, showed but two that provided space for information covering special risk of health or accident. These were both from lead works. This survey of medical and surgical records did show, however, innumerable supplemental blanks and forms to be forwarded to employment, safety and time-keeping departments, foremen, hospital superintendents, visiting nurses, beneficial societies, and to other destinations too numerous to mention. These supplemental forms and record cards demonstrate the futility, at the present time, of attempting to outline one form

to cover all industries. There have been many attempts to classify the industries by industrial and health hazards. In general they are unsatisfactory. A great step in the direction of standardization would be the general acceptance and use of standard names for diseases, injuries and poisons. The Bureau of the Census, United States Department of Commerce,¹ has published such a list which should prove of value.

As a comment on the many accident and health record blanks examined, it may be noted that apparently the most frequently used and the most satisfactory method of record keeping is the card index system. A cross index is the safest, especially if there is not a fully organized employment department or safety bureau. A master card should be made out for every sick or injured employee. This card contains his name, residence, and check number. It is a brief record of accident or illness with time lost, compensation paid and end result. This card is to be filed *alphabetically*, and it refers by number to each accident or sickness record card. This master card is designed to hold a short summary of all the accidents and cases of illness sustained by the individual during his employment by the company.

The accident record card is used only for the history of one injury and is filed *numerically* with a progressive numbering stamp. Various modifications of this system will of course have to be employed to meet the individual requirements of different industries. Filing by check letter has its advantages when summarizing the injuries by department, but it has the disadvantage of having to provide for changes in check numbers and frequent transfers. The envelope system in which a complete history of every man is kept in an envelope bearing his name has many advantages, but it is bulky and requires a large amount of filing space. Visible index systems should receive consideration, especially for stock and master cards.

After there has been an accumulation of medical and surgical data, the problem of analysis presents itself. The method of analysis is largely a matter of personal opinion. The object of the analysis is generally a simple statement of fact. A survey of the summary sheets from the various industries will show that there are as many methods as there are plant physicians and statisticians. The method of analyzing depends therefore on the method of keeping and summarizing records. An analysis may be started with a survey of the lost time cases of sickness and accident, establishing a severity and frequency rate per thousand for the entire plant by departments, trades and occupations. It would, of course, be advisable to compare these rates with the established rates of insurance companies, or other industrial establishments.

¹"Standard Nomenclature of Diseases and Pathological Conditions, Injuries, and Poisonings for the United States." First edition, 1920.

These data may be compiled by taking the various cases of accident or illness, classifying them, and allotting to the various classes of disabilities the days lost, wages lost and money spent as compensation, sick benefits and gratuities. The amount of money spent for compensation and sick benefits is a good measure for determining the severity rate of illness or accident. Each department's share of this total cost should be expressed in percentages and compared with the percentage of employees in that department. This same idea may be followed out regarding occupation or trade.

On the part of the attending physician, the results of his treatment for various conditions should be classified, in order to show to the management the saving in time and money made by the medical department, thereby justifying its existence. The medical, legal and economic phases of accident analysis blend so imperceptibly that it is impossible to draw a line of demarcation.

There are many aids to analysis in use by various industries. As examples of such aids there may be mentioned cards of many colors signifying different conditions, metallic signals and tags and cards printed in symbols to permit of punching for automatic mechanical sorting and counting.

The final object of analyzing medical and surgical industrial records is the improvement of existing conditions, either in the method of treating disabled men, or in the saving of compensation or other benefits by the reduction of lost time, lost wages and lost output. At the same time the knowledge gained from statistics should be applied to the individual worker in an effort to improve his mental attitude toward his work and his physical ability to produce.

The easiest, simplest and most satisfactory method of comparing sickness and accident rates, and interpreting them, is by the use of graphic charts.

The ability to interpret statistics properly presupposes a thorough knowledge of the class of employees, the character of the work, the system of time-keeping, and the company's organization. In addition, an exceptionally keen power of deduction and observation is sometimes necessary. It is more than easy to misinterpret statistics. All related data should be considered when conclusions are to be drawn and acted upon. Attendance records, weather conditions, industrial conditions, economic conditions, labor troubles, etc., may all influence or be responsible for the misinterpretation of statistical data.

Interpretative conclusions can be developed into corrective action only by the whole-hearted endorsement and cooperation of the management. The industrial physician should have ready access to a company official without an intermediary. When the endorsement of the management has been obtained, interdepartmental cooperation is more readily assured, and

this is the easiest and most direct way of obtaining that cooperation which is essential. Without the cooperation of workmen, foremen, and department heads, men are allowed to work who should be at home, disabled; and workers are at home with alleged disability who are able to work. Employees receive benefits when not so entitled and those so entitled frequently are denied such remuneration. Men unsuited to their work are kept in certain positions, while men who could work efficiently in such positions are working elsewhere, less efficiently. The keeping of time-lost records is impossible without departmental cooperation. The keeping of accident frequency records is impossible if the men are not permitted and encouraged to report to the dispensary. The cost of maintenance cannot be learned without the cooperation of the accounting department. The compensation costs cannot be learned without the assistance of the insurance carrier, or those in charge of an insurance or beneficial fund. The legal standing of a liability or contested compensation case can be learned only through the good will of the attorney for the company, or insurance carrier. The confidence of the safety department is necessary in order that it may act upon the recommendations of the dispensary, while the employment department should stand in the closest possible relation to the medical department, since it is responsible for the class and character of the employee. The success of the medical system in an industry depends upon the hearty cooperation of all departments with the medical office.

DENTAL WORK IN INDUSTRY

Voyle A. Paul, M. D.

*The Yale & Towne Manufacturing Company, Stamford,
Connecticut*

The modern factory is no longer merely a collection of buildings used for manufacturing purposes; it is more truly a complete town within itself. Many of the activities formerly considered as having an individual or community interest only, are now being established within the industrial organization. It is realized that while these activities have a bearing upon individual and community problems of a public health nature, they also have a direct bearing upon industrial activity. Many employers now know that to employ men without considering their social and physical welfare is imprudent. When John Smith, Sr., began work fifty years ago, he was introduced to his job, told what his wages would be, and that was the end of it. He might be mentally unfitted for his work, he might even be suffering from sickness, but, said the employer, that is John Smith's business and no concern of mine.

We know better now. When John Smith, Jr., comes to work, we take care of his physical being. We treat his scratches and bruises, and even his headaches and stomach-aches, and we know that it pays us to do so. We give him athletics for the week-end; our library supplies him with books; our shop paper keeps up his "esprit de corps," and in general we have discovered that, if considered in terms of dollars and cents only, it pays us to keep John Smith, Jr., a physically fit, mentally awake, human being.

There is no doubt but that the dental clinic comprises a very important part of this modern health service in industry. Its institution is economically sound, too, as we shall attempt to prove. Dr. Rae Proctor McGee says:¹

"The most frequent cause of loss of time from industrial institutions is preventable diseases of the mouth and teeth, or diseases that gain their entrance to the body through the mouth.

"There was a time when we considered the health of the mouth from merely a humanitarian standpoint, but that time has passed and we now know that oral conditions are just as much an economic factor as are fluctuations of the money market.

"With young workers, the health of the mouth must be maintained or they will never become old workers, and with the older workers, those whose experience and thought and skill have more than compensated for the loss of some of their earlier energy, the factor of oral hygiene, mouth health, is the greatest single factor in the preservation of their abilities for a normal period of years.

¹"Organization." [Editorial.] *Oral Hygiene*, Vol. 12, No. 4, April, 1922, p. 542.

"Wherever a firm neglects to make provision for the care of the mouths of its employees, that firm is overlooking one of the greatest factors in a uniform and continued effort for the advancement of the business interests to which their energies are devoted.

"For many years we thought of the dental profession as a luxury for the wealthy, then as a humanitarian institution for the prevention of pain, disfigurement, and all of those inconveniences that come from the loss of teeth.

"Then we began to realize that mouth conditions are not purely local, but are essentially general in their effect and in the necessity for their treatment, and we now realize, just as all of the thoughtful business interests will soon realize, the fact that the energy and regularity of effort upon the part of every individual, from president to office boy, depends to a very alarming extent upon whether or not the dentist has been consulted."

Physical examinations of applicants for employment show that 95% of all workers have defective oral conditions. Our own works' dentist, Dr. Ira D. Beebe, goes further, and says that 20% of all workers examined at their own request suffer from pyorrhea alveolaris, some in well advanced stages.

Dr. D. B. Lowe of the B. F. Goodrich Company, says:¹

"My impression from my own experience is that there is a negligible percentage of diseased conditions *other* than teeth."

Industrial physicians everywhere report that a large number of cases of arthritis and neuritis have been benefited, and in many instances cured by cleaning up the mouth. In our own plant we treated more than 7,000 patients in twenty-two months. Our shop paper, *The Panel*, said in its issue of September 15, 1921:

"The value of the Dental Clinic as a part of our Health Service is beyond any cavil or question—the extent of its use since it was opened removes all doubt on that point, for unless the service rendered met the need in a successful manner, the patronage of the clinic would have fallen away."

The employee who needs emergency work should be free to visit the dentist at any hour. All emergency work and the examination of teeth should be made on the company's time. The constructive work, however, may be done on the employee's time.

In my industrial experience the necessity for emergency work has shown the need of a full-time dentist. Furthermore, the volume of constructive work required is sufficient to warrant employing a full-time dentist. It is also apparent that the good results of the time saved by the dental clinic are nullified if the emergency patients find it necessary to leave the works during the time that the dentist is absent. For our own part, our dental clinic has a full appointment book for three weeks ahead

¹Personal communication.

at all times. Dr. Rood of the American Bosch Magneto Company¹ states that the appointment book of their dental clinic is always full for two weeks ahead.

Different types of work are done in different industrial dental dispensaries. In our clinic we do work as follows:

Free to Worker	{	Emergency treatments, Emergency extractions, Examinations, Advice on work not undertaken.
Charged to Worker	{	Cleaning and prophylaxis, Root canal treatment and filling, Alloy and silicate fillings, Reset crowns, bridges and inlays, Pyorrhea treatments.

There are three distinct ways of educating the worker—by personal talks, bulletin boards and the shop paper. The talks should never be given to groups, but rather by personal advice of the dentist to each patient. The care of the teeth, etc., is explained, and dental supplies should be kept on hand for sale at cost.

Posters could be used (there are many of the "horrible example" type) to attract the attention of the employees, no matter in what corner of the shop they may be. Space in shop papers can be utilized to present educational cartoons, or to tell actual experiences. The articles in our own house organ, written by the works' dentist under the heading of "Tooth Talks," are of a different type. They are always short, very bright, and invariably begin with the latest "dentist joke." By some of these methods the subject of oral health can always be brought to the attention of the worker.

The value of the dental clinic to the worker himself is apparent. He derives from it every benefit that dentistry has to give. Besides the relief from pain and the improvement in, or cure of, cases of arthritis and neuritis as noted by industrial physicians generally, it is beyond cavil that there must be an improvement in all diseases caused by the seepage of the poison from foci of infection into the circulatory system. The worker further benefits inasmuch as access to the dentist is made easy. How many workers go to the plant dentist who ordinarily would not trouble about their teeth, and find that they have arrived barely in time to correct serious oral conditions? Let us remember, as before noted, that 20% of the workers of the Yale & Towne Manufacturing Company, who voluntarily visit the dentist, show cases of pyorrhea.

Then there is the important detail—especially to the worker—of cost. The plant dental clinic does his work for a merely nominal sum. Furthermore, and this statement has been

¹Rood, A. D., "Dental Dispensary in Magneto Plant." *Hospital Management*, Vol. 10, No. 5, Nov, 1920, p. 56.

carefully checked, he loses but an average of one-half hour for an emergency treatment, instead of the usual half-day.

The amount of money saved to the worker in lessening the number of working hours lost is a considerable item, as the following figures show: In a period of twenty-two months our records show that 6,043 patients attended the dental clinic for emergency treatment. Presumably these people were suffering pain, and it is estimated that fully 80% of them would have gone to an outside dentist if there had been no plant clinic available. This 80%, or 4,832 workers, would have lost the rest of the half-day, and many the rest of the whole day, if their trouble occurred in the morning. It is conservative, however, to estimate a loss of a half-day, or four working hours per case, a total of 19,328 hours of production. At the average wage rate of forty cents per hour, these 19,328 lost hours represent \$7,731.20 saved to the workers alone, to say nothing of the saving in charges of outside dentists for this work.

Apart from bettering the health of employees, and the resultant higher quality of workmanship, the employer benefits in the extreme in the saving of working hours. The average time spent on each case in the dental clinic is thirty minutes. We have already noted the 4,832 workers who would have left the plant to have emergency treatments had there been no plant dentist, and how these patients would have lost 19,328 working hours. Our dental records show, however, that these 4,832 workers were absent from their benches or machines but thirty minutes each, or 2,416 working hours. In other words, there is a saving of 16,912 hours in production time. We cannot attempt to put into terms of money the worth of these working hours to the employer. Possibly some realization of what this lost time means might be gained upon hearing the wails of grief that a few hours of lost time bring from the employment manager, and his friend, the production manager, with their problems in turnover, overhead, and production costs.

The question of cost also interests every employer. We submit without comment the following figures covering the dental clinic of the Yale & Towne Manufacturing Company. It is to be remembered that these figures cover a period of twenty-two months, during which time the dental clinic employed a dentist and a part-time dental hygienist.

Number of patients, 7,328.

Number of emergency treatments, 6,043.

Number of cleanings, 949.

Number of teeth extracted, 662.

Number of minor fillings, 2,322.

Gross operating expenses, \$7,756.

Receipts (payment for services), \$2,228.

Net cost to The Yale & Towne Manufacturing Co., \$5,528.

The cost per patient of running the dental clinic during this period was \$1.06. Deducting from this figure the amount paid by patients for such service as was not free, we find that the net cost of each patient to the company was 75 cents. Stated in another way, the company in the twenty-two months covered by the above figures, made a direct contribution to the well-being and comfort of its employees, through the dental clinic, amounting to more than \$5,500.

While the costs to date are unavailable for tabulation, we have found that during the first four months of the present year (1922), the operating cost of our clinic has been reduced more than one-half from the figures quoted above.

Is it worth while? It seems to be. Our own dental clinic, now in its third year, is still operating and the appointment book is kept filled three weeks in advance.

TUBERCULOSIS AND HEART DISEASE AMONG INDUSTRIAL WORKERS

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TUBERCULOSIS

It is safe to state that in all probability tuberculosis is the most important single disease in any community. It causes more deaths than any other disease in early adult life; its crippling effect upon the industrial worker has long been recognized. Contracted in the majority of cases in childhood, the disease lies dormant until early adult life when, due to the effect of employment in insanitary surroundings, poor housing, overwork, or in many cases late hours and poor personal hygiene at home, it bursts into activity. Often this smouldering activity is fanned into an active flame by some form of respiratory disease; hence a recent cold or attack of broncho-pneumonia, or influenza, appears to be the exciting cause. The tubercle bacillus, which is the organism causing the disease, may attack any part of the body, but in young adults of working age its point of preference is the lung tissue. For this reason lung or pulmonary tuberculosis is the type of disease most found among workers.

The disease appears in every industry. Office workers are no less susceptible than manual workers, and in many factories the largest percentage of tubercular workers is found in the office force.

There are, however, certain industrial conditions which are particularly unfavorable for workers with a tubercular tendency. These industries are those in which the atmosphere is contaminated by dust, or in which the working conditions are dark, cold and wet. It is very difficult to get accurate statistics of the percentage of workers affected. This can be obtained only by a long and careful survey of the industries of the entire country, as the disease appears in all.

The entire movement toward industrial medicine probably owes its origin to pulmonary tuberculosis. In 1909 a great move to reduce the prevalence of tuberculosis swept the country. In Chicago a number of factories, in order to find out the prevalence of the disease in their organizations, instituted physical examinations of the chests of all employees. The facts brought out by the examinations were so important that complete physical examinations followed, and these, coupled with the corrective and follow-up measures, rapidly developed into the art of industrial medicine.

Employment of the pre-tubercular, that is of those having dormant tuberculosis, is necessary and is harmless provided the individual is watched and placed at work which will not stimulate the quiescent disease. No worker suspected of having latent tuberculosis should work in a dusty atmosphere, in the cold and wet, nor should he do extremely laborious work. He should be kept under careful medical supervision, and methodically examined after an attack of sickness, especially if this is of the lung type. While it is generally recognized that individuals having latent or arrested tuberculosis, should confine their work to non-laborious types, out of doors if possible, it will be readily seen that this is impossible in practice. Most workers have developed some special type of work of which they have more or less expert knowledge, and it is difficult for them to earn a livelihood at any other occupation. It therefore falls upon the factory medical department to keep these men and women at their work and by sanitary improvements and medical supervision prevent their developing active disease. The method by which this is done is as follows:

Each worker on entering the employ of the company has a complete physical examination. If any lung defect is found which suggests latent tuberculosis, a special form is made out which goes into the past history, habits and symptoms of the worker. The work which he is to do is next carefully analyzed, and the foreman is instructed to put him in surroundings which are as free from dust and darkness as possible. It is often possible to have the patient work near a window, or in a well-ventilated part of the factory. After the work and work place have been arranged, the home conditions are carefully reviewed, the visiting nurse being sent to the patient's home to give instruction and review the living conditions, which she reports back to the physician.

After a month or so the worker is called back to the dispensary for another examination, and if no further symptoms are found it is pretty good evidence that the work he is doing agrees with him. He is, however, instructed to return to the shop dispensary for re-examination if a cough develops.

All employees, whether suspected of having tuberculosis or not, should have a careful chest examination, a series of sputum examinations, and an afternoon temperature reading for any cough lasting over three weeks.

The active tubercular patient, that is, the worker who has active signs of pulmonary tuberculosis, should not be permitted to continue at work. If he continues he is a danger to himself and others, for no matter how careful he is, the part of the factory in which he works is bound to become contaminated.

If it is discovered early and immediate treatment is instituted, tuberculosis can be arrested and the patient made able to lead an active productive life. This can be readily

managed at present. The patient is sent home, his family physician notified, and if he has no family physician application is made for his admission to a state or private sanatorium. It has been found that the careful supervision and regular life at a sanatorium procures a more rapid arrest of the disease than any other form of treatment.

After arrest of the disease has been effected, work suited to the patient usually can be found in some department of the factory and the arrested case returned to work under supervision of the factory medical department.

The great decrease in death from tuberculosis, which has followed the inauguration of the anti-tuberculosis campaign, is due largely to the present early recognition and prompt treatment of the disease, and in no place has this been carried out more brilliantly than in those industries maintaining an efficient medical service.

HEART DISEASE

While tuberculosis has for years past been recognized as one of the prevalent diseases among industrial workers, it is only recently that the attention of the public has been called to the prevalence of heart disease. While heart disease does not produce the early mortality of tuberculosis, for the past three years organic heart disease has caused more deaths in the registration area than tuberculosis. Dublin¹, in a résumé of the importance of organic heart disease to the community, gives the following statistics:

"Prevalence

Two per cent of the persons examined by insurance companies are rejected because of serious heart defects.

Two per cent of industrial workers are found on careful examination to be subjects of serious heart defects.

Two per cent of those examined in the draft and camp examinations by Army medical examiners were rejected on account of serious heart defects.

One and one-half to two per cent of the children examined in the schools show serious heart defects.

"Effects on Longevity

It has been found that heart disease has a serious effect on longevity, reducing the span of life by practically one-half.

"Mortality

The death rate from organic heart disease for a series of recent years has been fairly stationary, its rise to first place being accomplished by the fall of tuberculosis.

Under 25 years of age organic heart disease causes as many deaths as typhoid fever.

Between 25 and 34 years organic heart disease causes as many deaths as lobar pneumonia.

¹Dublin, Louis I. "Heart Disease, Prevalence, Effect on Longevity, Mortality." Leaflet prepared for the Association for the Prevention and Relief of Heart Disease.

ERRATUM

The table on page 45 gives the *number of plants* replying to the questionnaire mentioned, and *not* the *percentages* of heart disease found in those plants.

Between 35 and 44 years organic heart disease causes more deaths than Bright's disease.

After 45 years organic heart disease shows a higher death rate than any other cause."

From these figures it is probable that approximately 2% of all workers are liable to the interruptions of steady work and other disabilities to which patients with organic heart disease are subject.

In order to find out with some degree of accuracy the percentage of heart cases actually appearing in industry, a questionnaire was sent to twenty large factories having medical departments. The number of employees varied from 200 in the smallest to 11,000 in the largest plant.

The percentages found in the various industries were as follows:

Rubber company.....	1
Telephone company.....	1
Electric light and power.....	3
Machine tool.....	1
Thread.....	1
Photographic material.....	1
Electric fixtures and machines.....	1
Shipbuilding.....	1
Steel.....	1
Sheet and tube steel.....	1
Motor cars.....	1
Powder and chemicals.....	1
Agricultural implements.....	1
Wire goods.....	1

The total number of employees in the establishments giving figures was 65,218. The average percentage of heart cases among this number, partly actual figures, partly estimated figures, is 1.93, closely approximating Dublin's figure of 2%.

The highest per cent of heart cases given was by a motor car company with an actual figure of 5; the lowest by a photographic supply manufacturer with an actual figure of .5. Another interesting feature was the small number of cases showing signs of decompensation. Among 55,872 employees only 521 showed signs of decompensation, and 468 of these came from a shipbuilding concern. In the answer to but one questionnaire was the type of work considered a real factor in etiology, and there only in two cases. None of the others reported a case.

White,¹ in an admirable paper recently published, says: "There is not as far as I know any industrial heart disease." The majority of industrial physicians will agree with this statement, which means that the heart disease found in industry is in the majority of cases directly traceable to some condition not connected with industry. Although there are substances

¹White, Paul D. "The Problem of Heart Disease in the Industrial Worker." *Journal of Industrial Hygiene*, Dec., 1921, Vol. 3, No. 8, p. 225.

which cause disordered action of the heart and heart weakness, no industrial poison known has a specific effect on the heart resulting in disease of that organ. Arteriosclerosis, or thickening of the arteries, as he points out, is a very important cause of heart disease, but whether arteriosclerosis can be attributed solely to work in industry is questionable. That it may be due to lead poisoning is recognized. One of the classifications adopted by the Association of Cardiac Clinics in New York and quoted by White is as follows:

1. Those able to carry on their habitual activities without symptoms of distress;
2. Those able to carry on slightly curtailed activities;
3. Those able to carry on moderately decreased activities;
4. Those able to carry on only greatly diminished activities;
5. Those unable to carry on any of their habitual activities.

Classifying employees of a single large factory employing about 3,200 industrial workers we find:

Class 1.....	52 cases
Class 2.....	13 cases
Class 3.....	8 cases
Class 4.....	3 cases
Total.....	76 cases

The broad variation in the number of cases of heart disease found in different industries suggests the explanation that usually in the course of time the worker finds his own physical level. That is, when an industrial worker develops symptoms of pain, shortness of breath, or palpitation of the heart, he instinctively changes his work to a type which will not produce these symptoms. The worker with heart disease thus comes to realize that there are certain kinds of work he is unable to do, and adjusts his life accordingly. The result is that in unskilled and semi-skilled work only those are found who are physically able to carry on the required activities without discomfort. Arguing still further from this, one would expect to find a correspondingly high percentage of cardiac cases in the more sedentary occupations. This, however, is not borne out by the statistics now available. In a series of investigations of the physical condition of workers in different industries, the United States Public Health Service found the following percentage of heart cases:¹

Garment trades.....	3,000
Affected hearts (male).....	4.8%
Glass workers.....	1,511
Affected hearts.....	8%
Foundry workers.....	1,286
Affected hearts.....	11%

¹Personal communication.

Chemical workers.....	904
Affected hearts.....	6.9%
Cigar workers.....	398
Affected hearts.....	10.4%
Steel workers.....	1,293
Affected hearts.....	14.1%

All these workers, however, were carrying on their work, so that the heart was probably capable of bearing the load placed upon it.

In considering work as a causative factor in cardiac disease, though this may have played an important part in the past and possibly does today in certain industries which require heavy work for long hours, the tendency through the country is to reduce the work schedule to 48 or 50 hours a week. This, with the elimination of alcohol, may have an interesting effect on the hearts of the present rising generation.

Heart disease in industry as elsewhere has two main causative factors; bacterial infection and arteriosclerosis. Bacterial infection is due to the invasion of the heart lining and muscles by bacteria or their poisons. The bacteria rarely attack the heart alone. They usually first attack some other part of the body and are later carried to the heart by the blood stream. Thus the bacteria causing tonsilitis and rheumatic fever appear to have an affinity for the heart which they attack, leaving it in a damaged condition. The same is true of many of the infectious diseases.

After the acute invasion of the heart subsides the heart is left in a damaged condition both as to its musculature and its valves. The so-called case of chronic heart disease is in reality not a disease in the technical sense of the word, but the result of previous disease. This type of heart is very common in industry. The arteriosclerotic heart is caused by general arterial thickening which involves the heart blood vessels as well as the other blood vessels in the body. This causes circulatory changes in the heart itself, which lead to degeneration of the muscle. In addition to this the actual work of carrying on the circulation is increased.

Although, as previously stated, long hours of very hard work may lead to arteriosclerosis, the disease is very common among men who lead sedentary lives and is more probably due to heredity, errors of diet, alcoholism or some disease of metabolism rather than to actual work. If pathogenic bacteria were eliminated the heart could probably stand any reasonable amount of work without resulting disease.

What is now being done for the industrial worker having heart disease? In the vast majority of cases the heart, when examined by the industrial physician, is found to be an already seriously damaged organ. It is capable of carrying on its work,

but it can take on no extra load without signs of failure. Medicine, while of value to ward off a crisis, or to bring back a flagging heart, is not indicated in the majority of cases. What is needed is an estimate of the amount and type of work the heart can do. Inasmuch as physical work calls for a corresponding amount of work by the heart, a preliminary work test is needed to find out whether the work assigned by the employment department will be in keeping with the power of the heart. If the industrial physician finds a damaged heart apparently doing good work he assigns the applicant to the work already laid out for him by the employment department provided this is work similar to that which he has been doing for the past six months elsewhere. If the heart is not acting well the applicant is put through a rapid exercise test of hopping on one foot 50 times or raising a 25-lb. steel bar above the head twenty or thirty times. The heart is then re-examined and an estimation made as to the type of work to which the worker should be assigned. All heart cases are carefully recorded and re-examined at regular intervals.

If it appears that work which is being carried on is too much for the heart, the work is adjusted to meet the worker's needs. Inasmuch as two-thirds of the worker's time is spent away from the factory, it is most important that he should be carefully instructed as to what types of activity should be avoided.

With a careful primary examination and record, an adjustment of work when this appears advisable, re-examinations at regular intervals, and careful instruction as to proper living outside of factory hours, patients with heart disease may carry on in industry with minimum risk and with maximum value to themselves and to the community.

EPIDEMIC DISEASES AMONG INDUSTRIAL WORKERS

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Whenever numbers of persons are brought together in close contact, opportunities for the transmission of communicable disease are created. Notwithstanding the general acceptance of this fact it was not until recently that attention was directed toward the control of the communicable diseases in industry. Health officials and physicians generally have long recognized that overcrowding in the home plays an important rôle in the spread of the epidemic diseases. The bringing together of children in the school has also been recognized as creating a fertile field for the dissemination of contagious diseases, and our efforts have been directed most successfully toward the prevention of these diseases among children in the schools. Indeed, the splendid reduction that has been made in the incidence and mortality of the epidemic diseases must be attributed in large measure to the introduction and operation of school medical inspection.

Other than the difference in the ages of the persons exposed, the problem of the control of epidemic diseases in industrial plants differs little from the problem in the school. Indeed, the epidemiology, clinical course and pathology of these diseases differ in no wise, whether they occur among industrial workers or among the general population.

The control of communicable disease in industry is of vital interest to the health officer because the prevention of these diseases is his job, whether they occur in the home, the school or the work place. The control of these diseases is of paramount interest to the worker, because to him it means the prevention of loss of income through illness. Their control is of no less importance to the employer, because illness which incapacitates his employees interferes with the production of his plant through absence of employees and through subsequent lowered efficiency.

The control of disease, whether in the workshop or in the community at large, is not a philanthropic project, but a hard-headed, dividend-paying investment. An industrial worker infected with an epidemic disease is a source of danger to his fellow workers, because he exposes them to infection; to the industry, because by exposing his fellow workers he may cause an epidemic that may cripple the plant; to the community,

because his fellow workers who are exposed to infection by contact with him may carry the disease into their homes, whence it may be distributed by other members of their respective families to the schools and to other industries. It is evident, therefore, that the prevention of epidemic disease in industry is tied up closely with the prevention of epidemic disease in the community in which the industry is situated, and if our efforts in either field are to be successful there must be cooperation, and, in fact, the closest teamwork between the industrial physician and the health official.

If on the one hand public health conditions are poor, if the water supply is impure or inadequate, if there is insanitary sewage disposal, unchecked fly and mosquito breeding, unguarded milk and food supply, lack of control of the contagious diseases by quarantine, vaccinations, prompt use of diphtheria antitoxin and other methods, then the industrial physician will be almost helpless in combating disease among the workers intrusted to his care. On the other hand the health officer will be seriously handicapped in his work if disease be permitted to exist unchecked in the industrial plants of his community. To the extent that communicable diseases are preventable, their occurrence in a community in epidemic form, or indeed in normal degree, constitutes a reproach to the health officials. So too, their occurrence in an industry may be a reflection upon the efficiency of the industrial medical service. If there be no such service, the owner of the industrial establishment, whether large or small, is not only economically wasteful, but culpably unmindful of his duty to the community.

Every industry should maintain a medical service. If its size is not sufficient to justify or permit an independent one, then through joint action with other small plants in the vicinity it should maintain a cooperative service. A business organization with no medical service is incapable of coping with the communicable diseases in epidemic or endemic form. The only logical way to prevent epidemics is to reduce to a minimum the so-called normal incidence of the communicable diseases which is often tolerated complacently because the cases and deaths are few and occur so regularly that they have come to be accepted as inevitable; and also because the fact has been lost sight of that every sporadic case is a potential source of an epidemic.

Typhoid fever is a preventable disease, yet in how many communities is it still tolerated. A recent decision that typhoid fever contracted through drinking water supplied in the place of employment was compensable is most significant as an indication of the trend of public opinion toward the preventable diseases, and it also furnishes an additional economic argument to industrial managers to reinforce those which have already been suggested.

Malaria is preventable by such simple methods as destroying the breeding places of the anopheles mosquito; by digging ditches to drain marshes, by oiling stagnant pools and by screening cisterns; yet malaria goes unchecked in many communities, and indeed within the confines of industrial plants. The economic loss to employer and employees in one year would undoubtedly be sufficient to pay the cost of performing and maintaining the work necessary to eliminate this disease permanently.

Smallpox is preventable by the harmless procedure of vaccination, but still it is tolerated as an endemic disease in many places. I was astonished recently, when my attention was called to a report of illness among a group of 1,282 office workers, published by the United States Public Health Service,¹ to note that almost no comment was made on the occurrence of smallpox among this group. As Commissioner of Health of the City of New York, I should feel most guilty if a similar smallpox rate prevailed among the approximately two million persons industrially employed in our city. Notwithstanding the size of our city, the density of its population, the large percentage of foreigners, the never-ending stream of immigrants and travelers, smallpox as a cause of death has been absolutely eliminated. During the past nine years there has not been one death from smallpox in the city. The cases have been very few and those had been imported. Last year there were 29 cases of smallpox in this city, none of which was fatal. If such a record can be made in a city like New York, there is no excuse for smallpox being tolerated in a small community, or in an industry.

Let us define the word epidemic. The Standard Dictionary defines the word epidemic as: "Applied to a disease which, spreading widely, attacks many persons at the same time."

The medical dictionary defines it as: "Denoting particularly a disease attacking simultaneously a large number of people in the community." As commonly used, however, epidemic is really a comparative term. Many diseases that are preventable occur with such regularity that their existence is not considered as epidemic. For example, a mortality of two out of every thousand of the population from pneumonia is regarded as normal mortality. If a mortality rate one hundredth as great occurred from typhus fever, cholera or plague, the community and the health officials would be roused to a state bordering on panic. Familiarity indeed breeds contempt, but it is high time that health officials, industrial physicians and the community at large disposed of their contempt for the common preventable diseases.

Every case of illness and every death is an economic loss that must be shared by everyone in the community—the employer and the worker alike. While the prevention of disease entails

¹Brundage, Dean K., "Sickness Among Office Employees." *Public Health Reports*, Vol. 37, No. 10, March 10, 1922, p. 527.

an expenditure of money, the investment returns a hundredfold profit in dollars and cents. In New York City, for example, the death rate fifty years ago was twenty-eight per thousand of the population. In 1921 it was brought down to eleven per thousand, which means in plain language that a hundred thousand lives were saved last year, and if illness bears a ratio to mortality of 10 to 1, a million cases of illness were prevented. Assuming that an average life is worth \$500, fifty million dollars were saved through the decrease in the death rate. Assuming the average duration of each case of illness to be ten days, and the average cost of each day's illness, by reason of loss of work, medical care and other items, to be \$5.00 per day, another fifty million dollars were saved, making a total of one hundred million dollars. The budget for the Health Department for 1921 was something over five million dollars, the expenditure of which shows a profit of about two thousand per cent in the value of lives saved. It is true that last year's budget alone did not secure this entire reduction in mortality. It is the result of expenditures of previous years, but each of these previous years showed a reduction in mortality and illness which paid a profit on the investment of the current year.

In the past, health preservation has been looked upon as an abstract proposition. This view of health work has changed, though it still prevails in many places. The captains of industry, however, are now awakening to the fact that the preservation of the health of their workers pays in dollars and cents, and for the most part they are willing to spend money for this purpose. It is for the industrial physicians and the health authorities to supply them with facts and to direct their efforts. To this end the industrial physician should see to it that careful records are kept. These need not be elaborate nor filled with minute details. In fact, they will serve a better purpose if they are simple and direct. Aside from their administrative use, these records can be submitted each year to the directors as the justification of the expenditures of the previous year and as the basis of pleas for larger funds to extend the work of the service. Without such records the work cannot be carried along in either a scientific or businesslike manner.

Before discussing briefly the means of controlling the epidemic diseases in industry I should like to make the point that every communicable disease should be considered as epidemic. The fact that pneumonia or influenza and the other respiratory diseases occur continuously in an industry should not cause us to disregard them.

Typhoid fever, while in a measure an industrial problem, is for the most part a community problem, so that if this disease occurs in an industry the industrial physician should cooperate with the health official in tracing the source of the disease and in devising and carrying out methods to eliminate it. Water

supply and sewage disposal are the most important factors in the dissemination of typhoid fever. Having satisfactorily disposed of them we can then take up the less prominent though far from unimportant factors of carriers and of infection through flies. Where it is impossible to secure action by the community to install a pure and adequate water supply and a sanitary sewage disposal, the workers should be warned of the danger, instructed in methods of prevention and offered the protection of vaccination against typhoid.

Smallpox is no longer the dreaded scourge of former years, because of vaccination; therefore, as a pre-requisite to employment, recent vaccination should be insisted upon. On this point there should be no quibbling. In this city, compulsory vaccination is enforced. Our smallpox record since its enforcement has justified the action.

Malaria is another disease that requires the cooperation of the health officials in order to secure the destruction of the breeding places of the mosquito. It will be useless for an industry to clean up its own grounds if the outlying community neglects to do its part.

It is not possible in so brief a paper to discuss seriatim the methods of preventing the communicable diseases, nor would it serve a useful purpose, because, as evidenced by the foregoing examples, they are but the practical application of our present knowledge. A few suggestions, however, may not be out of place.

During epidemics or when an epidemic is threatening, some system of daily inspection should be installed. If the medical staff is sufficiently large to permit, all employees should be inspected each morning upon arrival, and suspicious cases held for examination. Where the medical staff is not sufficiently large to permit such general daily inspection, the foremen or forewomen might be instructed as to the symptoms to be looked for and directed to conduct a daily inspection of their respective forces and to refer all suspicious cases to the physician or his assistants.

The organization will be more than repaid for the time and effort given to such daily inspection by reason of the prevention of illness, and consequent loss of time, among its workers.

All absentees should be investigated to ascertain the cause of absence, which may be due to a communicable disease either in the worker or in a member of his family.

The medical service should be supplied by the health officer with a daily list of the communicable diseases reported to him in order that it may be checked against the list of employees for the purpose of preventing those in whose homes contagious diseases exist from coming to work and thereby exposing their fellow workers to infection.

All employees who have been absent on account of illness should be required to report to the physician in charge before being permitted to resume their work.

The medical service should establish friendly relations with the health authorities of each community, with the hospitals, dispensaries and other agencies engaged in health and social work. It is only through such cooperation that the greatest benefit can accrue to the efforts of each. This point, I think, should be emphasized strongly. We are all working toward the same end, but from different angles. If we are to secure the greatest measure of success our efforts must be united.

Education should not be neglected. The industrial physician and his assistants should carry on a continuous program of public health education, by means of lectures or talks, illustrated or otherwise, and by practical demonstrations.

I shall not dwell upon general sanitation of the workplace, including crowding, dry sweeping, spitting, the presence of gas, vapors or fumes, unclean conditions, presence of flies, etc., all of which have an influence upon the control of communicable diseases. I would, however, stress the point that home conditions have a most important bearing on health conditions in the factory and should not be ignored in any system of industrial medical supervision. The success of home work, of course, will depend upon the tact of the visiting nurse. Workers' families may resent visits by the representatives of the employer unless they are helpful and it is made evident that there is no desire to pry into personal matters or interfere with family routine.

I would also emphasize the fact that the time to prevent an epidemic is before it has appeared. Having once gained a foothold it can be controlled with difficulty. Should an epidemic occur despite our efforts, there should be no feverish activity giving rise to procedures of doubtful value that interfere with industry and with the daily routine of the workers. It is then time to tighten up our defenses, to seek out the weak points and strengthen them, to employ additional nurses and physicians if needed, to secure isolation and proper treatment for those affected, and to immunize the exposed by methods that have been proved of value.

As fire prevention is more valuable than fire extinguishing, so too, is epidemic prevention better than epidemic fighting.

The industrial physician should not limit himself to giving expert aid in engaging employees and placing them, or in giving first aid of a medical or surgical character. His duties should be of a broader scope, should cover the entire field of preventive medicine, and in this work there should be close cooperation between industrial physicians, public health authorities and the medical profession at large.

STANDARDIZATION OF END RESULTS FOLLOWING INJURY

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In estimating the outcome of a given injury, it has long been the habit of physicians to use such descriptive words as "good," "fair," "poor." However, what may be a good anatomical result may be a poor functional result, or the reverse. A patient with a broken leg may leave the hospital with the fracture firmly united in a straight line; from an anatomical or surgical standpoint the end result would be rated as good. Perhaps this same patient, however, has a stiff ankle as an accompaniment of the healed fracture, and this stiffness may prevent return to work; hence from a functional or working standpoint the end result is not good, but on the contrary is poor.

To overcome difficulty of this sort, the writer has for some time made use of an end-result classification based on three essential factors which constitute return to normal, viz., function, union, contour. First of all, we must recognize that function is the aim of treatment, and hence in our arbitrary classification of end result values we rate function three times more valuable than the other two factors. Next to function, we list union, meaning to imply that knitting or healing of the injury is a necessary element of success. The last factor is contour, covering the appearance and general form of the injured part.

On the basis of 100% for these three elements combined, we allot 60% for an outcome with perfect function, 20% for perfect union, and 20% for perfect contour.

In a case of a broken leg, for an example, we determine what is the function of the limb in respect to walking, weight bearing and joint mobility. If this is perfect, we credit 60%; if, however, there is some imperfection, we deduct a certain amount from the perfect score, say 15%, and accordingly list our case as having for function 45%. Next, if the union in the bone is perfect, we allot to our score 20%; if there is some defect, we deduct a proportionate amount, say 5%, and list ourselves for union 15%. Finally, if contour is normal we add 20%; if not, we make a reduction, say 5%, and hence the rating for contour is 15%.

A perfect rating would be:

Function.....	60%
Union.....	20%
Contour.....	20%
Total.....	100%

In the example just considered, the rating was:

Function.....	45%
Union.....	15%
Contour.....	15%
Total.....	75%

It is submitted that a mathematical rating of this sort is more nearly exact than a verbal rating of the type usually employed.

Injuries to bones and joints naturally offer the greatest field for using this classification; however, wounds of the soft parts, ordinary surface wounds and burns included, and wounds of the tendons, blood vessels, and nerves can also be embraced by the same classification.

The terms used and the percentage allotted to each are of minor importance if the main element of function is constantly stressed, for this, after all, is the important phase of treatment.

If our bases for classification are the same, then our end results will be expressed in figures that are self-explanatory and of statistical value.

At present, one physician may classify a result as good and another physician might call the same result fair because neither physician had a classification standard based on essentials. This method is presented as a means of standardizing end results and is based on three essential elements that all physicians concede are important in estimating the outcome of a given injury.

It is agreed that other more explanatory or more inclusive terms might be used than the words "union" and "contour"; but there can be no disagreement as to the use of the term "function." This classification has been used by the writer often enough to prove its merit, and for statistical and recording purposes it has been of much value.

Our capacity to return an injured person to normal pursuits is the measure of success, and unless our functional outcome is satisfactory, the anatomical and the surgical outcome is of little importance. As physicians we know that a case can be discharged from the hospital as surgically cured, but that does not necessarily mean that the individual is then ready to resume his normal occupation. In this connection it is the part of wisdom to make sure that the follow-up of a given case ends only when the individual is restored to the maximum in terms of function.

RELATION OF THE PHYSICIAN IN INDUSTRY TO WORKMEN'S COMPENSATION LAWS

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The effective administration of workmen's compensation laws depends, in large measure, upon the work of physicians. By crude and bungling methods of treatment they can prolong disability and increase the amount of permanent defect, thus throwing a greater burden of expense upon industry and society. On the other hand, by skillful treatment and care they can reduce both the period of disability and the amount of compensation to be paid, thereby lessening the burden of expense to industry and to society.

In the enactment of many of the compensation laws, particularly the earlier ones, the part which the physician was to play in the scheme of compensation was given scant attention. It was soon found, however, that satisfactory results were not being obtained. There was frequent dissatisfaction on the part of the injured worker, and he justly complained that the treatment and care received under the law was lacking in quality and quantity as compared to the treatment afforded previous to the enactment of these laws. The cause of this dissatisfaction was not hard to find. It lay in the fact that the fees for the treatment of different conditions were fixed by law, and these fees were not sufficient in amount either to attract or hold the interest of the better and more capable medical men in the community. Where fees were not regulated by law or by ruling of the industrial commission, the insurance carriers usually designated the physician to handle the injury cases in plants whose insurance they carried, and economy was the rule here also. Dissatisfaction with "insurance doctors" was equally great, and it was not long before employers were supplementing the criticisms of injured workers with their own criticisms as to the length of disability and amount of compensation paid.

Employers were not long in finding out that capable medical service—though its initial cost was more than they had been paying—was the cheapest in the end, and so they began to take physicians into the factories, supplying them with quarters and equipment for the care of their injured workers. It was demonstrated that by immediate attention to all injuries, the amount of time lost from work was reduced materially, and that fewer injuries reached the compensation stage. The physician and the medical department thus became a recognized part of the industrial organization, and as such have assisted materially

in the improvement of working conditions, the development of the "safety first" idea, the reduction of time lost through accidents and illness, and the reduction of compensation payments.

The introduction of medical care of workers injured while at work created new conditions which could not be met by the application of existing laws. This was particularly true in the matter of confidential relations between physician and patient, which principle had prevailed under existing law. With the enactment of the compensation laws, a third party, the employer, claimed consideration because he was financially responsible for the payment of certain sums for certain types of injury. Accordingly, the compensation laws of 17 of the 42 states providing for workmen's compensation contain the provision that any physician who has examined or attended a workman claiming compensation may be required to testify as to his knowledge of the case, and that no facts determined by the physician in his attendance upon or examination of the claimant that have a bearing upon the case shall be privileged. The law of one other state, Iowa, says that any physician examining an injured employee "shall not be prohibited from testifying."

In three states¹ the employee is given specific permission to select the physician to treat his injury and his employer is required to pay for the services of the physician so selected. While this practice may be satisfactory in a few cases, it is not to be recommended for the reason that each employee is injured so infrequently that in selecting his own physician he may engage one who has little experience in treating such cases, and, therefore, is not in a position to give the best treatment. On the other hand, if the employer selects the physician, the one so selected becomes increasingly expert in the treatment of such cases because he treats a relatively large number. The physician selected by the employer will treat all injuries in the factory, while one selected by the employee will probably treat a very small number of such injuries. The employer will select the physician with the twofold object of giving the most skillful attention to the treatment of injuries, and of securing the early return of the injured to productive employment. For these reasons it is better that the choice of physician lie in the employer's hands than in the hands of the employee.

The legal limitations upon the length of time medical, surgical and hospital treatment shall be furnished to the injured worker, together with the very small fees permitted for this work, have done much to retard the natural development of the physician's work in connection with the compensation laws. The average maximum fee permitted for treating industrial accident cases is \$100, although in many cases this medical service must be supplied for a period of sixty to ninety days. In a large number

¹Massachusetts, Rhode Island, Washington.

of comparatively minor cases this fee limit may be satisfactory, but when a really serious injury is up for treatment, the limitations both as to fees and time allowed are of serious import, and tend to shift the treatment of such cases into less competent hands than would be the case if more generous allowances were made.

Inadequacy of treatment, both as to quality and quantity, frequently leaves the injured worker with a physical handicap, although his injury may be fully healed, from a purely surgical point of view. Such cases must needs have rehabilitation treatment, often of a prolonged and expensive character. The expense of this work is usually borne, in part at least, by the state, but the cost of such state aid finds its way back as an additional financial burden upon industry and the community. Had the proper medical and surgical treatment been given when the injury was healing, the necessity for much of this rehabilitation work, except in dismemberment cases, would be avoided, thus providing for a quicker return of the worker to productive employment.

The physician in industry who is in any way connected with the application of the compensation law should ever keep in mind the spirit of fair dealing between the employer, or insurance carrier, and employee. He should never allow his sympathies for either group to sway his decisions or actions, but should rest his opinions upon the facts as developed by his handling of the case. All states having compensation laws permit the injured worker to have his own physician present at any examination made, and in some cases the industrial commission reserves the same right. In this way methods of treatment employed are sure to be checked up by physicians who are either sympathetically inclined toward the injured worker, or who are neutral and impartial in their feelings toward both parties.

In many compensation cases where the evidence of the physician is of importance, there may be strongly diverse influences at work to obtain a settlement favorable to either the employee or employer. Some employers pursue the short-sighted policy of taking advantage of every technical opportunity to keep from paying compensation in greater amount than they are absolutely obliged to; while some employees will place themselves in the malingering class, falsely representing their symptoms and magnifying their injuries for the purpose of procuring compensation. In either event the physician who has treated the case, whether he be engaged by the employer or by the industrial commission, should stand fearlessly for what he knows is right, regardless of what influences may be brought to bear upon him. With no personal physical injuries to consider on the one hand, and no financial consideration on the other hand, his mind is open and neutral, and his opinion

should carry great weight in the final settlement of such disputed cases.

The physician concerned in a compensation case often labors under the disadvantage of having his methods of treatment evaluated and his testimony weighed by men who have no knowledge of medical matters. This leads to misunderstandings at times, and places the physician and his work in an unfavorable light.

The medical profession is but scantily represented in the personnel of industrial commissions charged with the administration of compensation laws, but one state, Washington, having a physician as a member of the commission by legal enactment. In this case the physician is chairman of the board. In three¹ states the appointment of a medical advisor is mandatory. In eleven² states the law provides that the medical advisor may be appointed by the board; and in nineteen³ states legal provision is made for one or more impartial medical examiners who may be called upon by the industrial board at any time to examine persons claiming compensation. In Pennsylvania, in addition to the medical examiners mentioned, the law provides for the employment of not more than three physicians on a full-time salary basis to make medical examinations and perform such other duties in connection with the work of the bureau as the board may direct.

The physician in industry can play a major role in reducing the number of accidents and the amount of compensation paid, by giving careful attention to the health of the workers and to their working conditions. No method yet devised for estimating the compensation risk of a worker has surpassed the physical examination of applicants for employment, and the periodic re-examination of the employed force. By this procedure workers unsuited for the occupation they desire to follow are directed into work not harmful to them, where the danger of accident is minimized.

The careful physical examination of all workers and applicants for employment, combined with a thorough and continuous campaign for "safety first" will do more than any other one thing to reduce the hazards of occupation and the amount of money spent in compensation, to say nothing of the relief from pain and suffering on the part of the injured worker and those dependent on him. Only one state, New Mexico, has recognized by law the value of physical examinations in their relation to compensation, and has made provision that, when demanded by the employer, an employee must submit

¹ Kentucky, Massachusetts, Oklahoma.

² California, Illinois, Iowa, Maryland, Nevada, New York, North Dakota, Ohio, Oregon, Washington, West Virginia.

³ Alabama, Arizona, Delaware, Georgia, Idaho, Indiana, Kansas, Louisiana, Maine, Michigan, Minnesota, Pennsylvania, Rhode Island, South Dakota, Tennessee, Vermont, Virginia, Wisconsin, Wyoming.

to an examination by the employer's physician as a requisite to obtaining employment. In time other states doubtless will follow the lead of New Mexico in this matter, as the justice of the principle involved becomes recognized alike by employer and worker. If physical examinations were required by law in the important industrial states such as Pennsylvania, New York, or Massachusetts, it is difficult to say what the actual monetary saving would be, but it would amount to a large sum, repaying many-fold the cost of the examinations both to management and men.

In conclusion, let us remember that while there is still much to be desired in the way of recognition and appreciation of the importance of the work of the physician in settlement of compensation cases, progress is being made. The physician in industry holds a strategic position in this work, and by adherence to high ideals of medical practice and fair dealing with both workers and management, can do much to further the spirit of cooperation and good will so necessary to the successful conduct of any enterprise.

PROPER RECOGNITION OF MEDICAL OPINION IN THE CONSIDERATION AND SETTLEMENT OF COMPENSATION CASES

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Forty-two of the forty-eight states now have workmen's compensation laws. These laws are designed to protect the rights and interests of injured employees, but in not a few instances claims have been filed under them grossly misrepresenting the extent of the injury. Indeed, as the various provisions of the acts become more generally known, claims are made for compensation for conditions further and further removed from the actual injury. The possible injustice of such claims does not reflect on the integrity of the compensation laws or their makers, but it does indicate that we must be mindful of the future.

The foundation of every compensation law rests on conditions due to bodily injury. Hence there are many distinct and important medical problems to be considered before there can be complete justice to both employee and employer. It should be considered, therefore, in the light of constructive criticism, when we industrial surgeons call attention to certain apparent discrepancies in the laws and offer suggestions to the end that compensation laws may be just to employee and employer alike.

Possibly my own attitude regarding workmen's compensation laws may be most briefly and clearly established by citing the fact that the company which I have served as chief surgeon since its organization twenty years ago, is thoroughly committed to the workmen's compensation principle. Our company voluntarily adopted a system of workmen's compensation for industrial accidents which antedated the pioneer legislation of Illinois on this subject. I might add that this volunteer system was more liberal in its provisions than the present Illinois statute.

In reviewing that part of the several compensation laws which has to do with the medical side of the question, certain provisions strike us as unusual, and perhaps as unfair to employee or employer. Since compensation laws are essential for the protection of the employee, we should see to it that these laws provide impartial justice.

I desire to call attention to five provisions, each of which appears in one or more of the compensation laws:

1. The employer is completely liable for accidental injury, even though it be shown that the accident merely accelerated some pre-existing disease of non-traumatic origin.

2. Under a certain law the employer must pay the same for an amputation whether the amputation be made at the point of election below the knee or at the hip joint; that is, no value is given to the knee joint.

3. In another state the law requires the employer to pay a set sum for amputation at the ankle. He must pay a few hundred dollars more for amputation one inch above the ankle. He must pay still more for an amputation two inches above the ankle, and so on.

4. If an employee, having lost the sight of one eye previous to engagement with his present employer, subsequently suffers the loss of his remaining eye by accident, his present employer must compensate him for loss of *both* eyes.

5. A potential or existing hernia, if aggravated by employment, must be compensated for.

There are other conditions along the lines of the five provisions mentioned, but these will serve the purpose of the present discussion.

The specific cases referred to herein did not come under my personal observation, but they are well authenticated.

The employer must compensate for a pre-existing non-traumatic condition if aggravated by employment. A painter died as a result of absorbing lead over a long period of years. A history of lead poisoning was obtained several years prior to his beginning at his place of last employment. The court held that the last employer was liable, although it was conceded that lead in the system had a cumulative action, and that it was not possible to tell whether it was the first particle of poison which entered the system that caused death or the last particle. It would seem that there was at least a fifty-fifty chance that this death was due to the lead which the man had stored up in his body some time prior to his last employment and that it was unfair to make the last employer assume the entire responsibility of the death.

A plumber was working at a windlass raising some pipes. He was taken with a cough and a bleeding spell and died. Autopsy showed a ruptured aneurysm of the aorta. The court said: "Rupture of the aorta by force from within is as distinctly traumatic as if the canal had been severed by violent application of a sharp instrument from without," and the last employer was held liable for compensation, although it was shown that this man had had a hypertension in the arteries for years, and that the aneurysm had been discovered months prior to his last employment. The existence of hypertension of the aneurysm is at all times a serious menace to life. Death may come at any minute whether the person be at work or at rest. This being the case, it would seem unfair to place the burden of responsibility entirely on the last employer.

A teamster got into a quarrel with a foreman. No blows were struck. A few minutes after the altercation, the teamster dropped dead. The physician testified that he had had a para

lytic stroke and a hemorrhage of the brain, and that the fear or the excitement caused by the quarrel raised the pressure within the vessels until the vessel walls burst. On cross examination the physician qualified his statement by admitting that the hemorrhage might have been due to the excitement, or the fall, or many different causes; that this was a matter of conjecture from the evidence, and that he would not attempt to be positive. On this testimony the court held that the evidence did not sustain the award and reversed the commission's judgment.

Subjects with high blood pressure and resulting cerebral hemorrhage are frequently picked up on the streets of our large cities. They receive no compensation, and yet if these same unfortunates happen to die within the four walls of a factory where they are employed, the employer is compelled to compensate for the death in nine cases out of ten.

The second point under discussion has to do with placing a value on the amount of stump left after amputation. Patients with amputation at the site of election below the knee frequently become nearly 100% efficient by means of an artificial foot. Others with amputation at the mid-thigh or above are able to get about with difficulty, even though they have the best artificial legs. If, in amputations of the leg, the knee joint can be saved, the function of the leg can be restored for all practical purposes. If the knee joint be lost, a much less satisfactory artificial substitute is possible. I am of the opinion that the framers of this law did not give sufficient value to the knee joint. This particular law goes on the theory that the loss of a small part of the leg is just as bad as the loss of the entire leg. This view is almost reversed in another compensation law, as is shown in discussing the third point.

The law referred to in the third point says that a certain sum must be paid for the loss of a leg at the ankle, and that more shall be paid when amputation is done one inch above the ankle, and so on. Each inch of leg amputated calls for more compensation.

Of the two laws in question, I believe the latter to be the better, and yet this law relating to amputation at or above the ankle wholly ignores the fundamental law of amputations, and by so doing puts a premium on poor surgical work. Under this law, if the surgeon desires, he may save money for the employer by removing the leg just above the ankle. This will leave a stump that will always be troublesome. If the surgeon be conscientious, he will remove the leg at the site of election and give the patient a good serviceable stump, one which will never be painful, and yet in so doing he compels the employer to increase the compensation by forty to fifty weeks.

In some states, if a one-eyed man be given work and lose his good eye in the course of his employment, his employer must compensate for both eyes; that is, the employer who is philan-

thropic enough to employ this unfortunate one-eyed man, and thus enable the man and his family to live, must be penalized if misfortune comes to the employee's remaining eye. This law is forcing a most undesirable condition. Small wonder if some employers were to decree: "One-eyed men must not be employed." This would work a great injustice to these unfortunate men, and they would eventually be dependent on charity. Before such an issue is forced, will it not be better for those states to modify the law, assume part of the responsibility now, and thereby work with the employer to the end that one-eyed men may be self-supporting?

The fifth point is one on which a great deal has been written. Surgeons of experience are today almost united in the opinion that all herniæ (except post-operative) are congenital in origin. In my personal experience, I have had but one hernia out of several hundred operated that showed evidence of traumatic origin. The opinion is that the man is born with a potential hernia, and that little by little this hernia descends, because of intra-abdominal pressure. There are places in the course of its descent where the resistance is less and where the descent is consequently more rapid. This explains why a hernia may not show today, and yet may show a marked bulging tomorrow. Many of the courts are disposed to ignore this argument of medical men. There is a tendency by some employers to refuse to hire men with hernia. This works a tremendous hardship on the employee. Here again, I ask, will it not be better for the state to meet the employer half way now, rather than wait until a great cry goes up from men suffering from hernia? A few are able to get work, but the army of such men is growing daily and their cry is ever louder, "Give us work."

When the margin of physical safety is small, the tendency is to put the risk entirely upon the employer. This may work for a while, but sooner or later the employer will rebel.

There is no method whereby the industrial physician has a direct voice in making the laws, but through his state and national organization the industrial surgeon can and should watch pending bills before the legislatures to the end that he may be in position to cooperate to the best advantage. Informal meetings between legislators, employers, and employees should be held for the discussion of past and pending bills. There should be a standing committee of the American Association of Industrial Physicians and Surgeons whose duty it would be to present to that organization the salient features of the laws pertaining to industrial accidents and hygienic conditions. The report of this committee should be discussed in open meeting to the end that the Association, as a whole, may take such action as it deems advisable. The report from the Association should then be placed in the hands of those influential in framing our compensation laws.

EYE INJURIES FROM THE COMPENSATION STANDPOINT

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VISION

Three main factors enter into human sight. Each factor is desirable, but not indispensable. In order of importance, they are:

1. Direct vision;
2. Indirect vision, or field of vision;
3. Binocular single vision, or the fusing into one image of the separate images of the two eyes.

Direct vision is the factor most often impaired in an injury to the eye. In the great majority of cases it is the only one involved.

The combined visual fields of the two eyes, indirect vision, extends about 170 degrees from side to side. For one eye it is about 145 degrees, so that total blindness of one eye contracts our indirect vision about 25 degrees. This factor of indirect vision is rarely lost as the result of injury.

A person who is blind in one eye, who has a squint, a dense central scar of the cornea of one eye, or who has a traumatic cataract, disease or injury of the central retina, loses the factor of binocular single vision. I do not believe, as some do, that this function is essential. When you think of the thousands and thousands of persons who have lost this function and who continue at their daily work unconscious or unmindful of their loss, this must be so. It has always seemed to me that it was one of the luxuries of sight, desirable but not indispensable.

COMPENSATION FOR EYE INJURIES

Each state has its own law and its own scale of compensation for eye injuries. Few of these laws are alike. They vary as to what constitutes "total blindness," as to what "industrial blindness" is, and as to what conditions are equivalent to the "total loss of an eye."

The compensation paid for the loss of an eye varies from 50% of wages for 50 weeks, to 66⅔% of wages for 125 weeks. The Massachusetts law provides for the payment of an additional sum, beyond the regular schedule, of 66⅔% of wages for 50 weeks. Some states make a lump sum settlement of from \$900 to \$1,500. Others endeavor to estimate the difference in earning power of a man before and after injury and compensate him accordingly. In Arizona the award is based on 50% of the difference between the earning power of the worker before and

after the injury, while in California the award is based on the nature of the injury or disfigurement and a consideration of the occupation and age of the worker. Several states make a distinction between blindness and physical loss of the eye or enucleation, blindness being compensable for a slightly shorter period than is enucleation.

Each compensation commission has its own method of estimating an eye injury. Many base compensation payments on loss of central vision, others on what they consider as loss of efficiency on the part of the claimant or his inability to continue at work. The latter method seems the fairer one, for we must remember that loss of vision and loss of efficiency are not the same thing, by any means. If a man has the sight of both eyes impaired by an injury, he will undoubtedly lose a part of his working ability; but it often happens that an injury to one eye may affect his working ability only slightly or not at all.

VISUAL DISABILITY

Numerous ingenious tables have been devised which purport to give the per cent of vision a person has lost when he has a certain direct vision following an accident to one or both eyes. But no two tables agree. One such table has been developed by Dr. V. A. Chapman of Milwaukee, Wis., and is as follows:

DR. V. A. CHAPMAN'S TABLE OF PERCENTAGE OF VISION LOSS¹

Vision of	Per cent Loss of Vision
20/20	0
20/30	5
20/40	10
20/50	15
20/60	20
20/70	25
20/80	30
20/90	35
20/100	40
20/110	45
20/120	50
20/130	55
20/140	60
20/150	65
20/160	70
20/170	75
20/180	80
20/190	85
20/200	90
20/210	95
20/220	100

The above table has been pronounced mathematically correct by expert mathematicians. The principle of this table is to allow $\frac{1}{2}\%$ loss of vision for each loss of 1 foot distance, which equals 5% for each loss of 10 feet distance.

¹Stieren, Edward. "What Constitutes Industrial Blindness?" *The Nation's Health*, Vol. 3, No. 6, June, 1921, p. 369.

A similar table has been developed by the Chicago Ophthalmological Society. It reads:

CHICAGO OPHTHALMOLOGICAL SOCIETY'S COMPENSATION TABLE
FOR VISUAL LOSSES OF ONE EYE¹

Visual Capacity	Per Cent of Visual Efficiency	Per Cent of Loss of Vision	Visual Capacity	Per Cent of Visual Efficiency	Per Cent of Loss of Vision
20/20.....	100.0	0.0	20/120.....	41.0	59.0
20/30.....	94.5	5.5	20/130.....	36.5	63.5
20/40.....	89.0	11.0	20/140.....	32.0	68.0
20/50.....	83.5	16.5	20/150.....	28.5	71.5
20/60.....	78.0	22.0	20/160.....	23.0	77.0
20/70.....	72.5	27.5	20/170.....	18.5	81.5
20/80.....	67.0	33.0	20/180.....	14.0	86.0
20/90.....	61.5	38.5	20/190.....	12.0	88.0
20/100.....	56.0	44.0	20/200.....	10.0	90.0
20/110.....	50.0	50.0			

A committee of the Medical Society of the State of New York² (Dr. A. C. Snell, chairman) in 1920 submitted a table of percentage vision and of visual disability. The three main factors in vision are "computed in the proportion of 2/5 for central visual acuity, 2/5 for field vision and 1/5 for stereoscopic (binocular single) vision." The table is as follows:

TABLE OF PERCENTAGE VISION AND OF VISUAL DISABILITY

Record of Central Visual Acuity at Twenty Feet	Percentage of Central Visual Acuity	Percentage of Average Stereoscopic Vision	Percentage of Average Field Vision	Total Vision*	Percentage of Total Visual Loss
20/20.....	100	100	100	100	0
20/25.....	92	100	100	97	3
20/32.....	84	100	100	93.5	6.5
20/40.....	76	90	100	88	12
20/50.....	68	80	100	83	17
20/65.....	60	70	90	74	26
20/80.....	52	60	80	65	35
20/100.....	44	50	70	56	44
20/125.....	36	40	60	46	54
20/160.....	28	30	50	37	63
20/200.....	20	20	40	28	72
20/250.....	12	10	30	19	81
20/320.....	4	10	20	10	90
20/400.....	0	0	10	4	96
10/250.....	0	0	0	0	100

*Central vision = 2/5; stereoscopic vision = 1/5; field vision = 2/5.

¹United States. Bureau of Labor Statistics, Bulletin No. 275, p. 86.

²Report of the Committee on the Computation of the Percentage of Ocular Disability due to Injury." *New York State Journal of Medicine*, Vol. 20, No. 6, June, 1920, p. 198.

A committee of the American Medical Association (Dr. Nelson M. Black, chairman) in 1921 presented a report¹ on estimating compensation for eye injuries in which the assignment of definite values to the three essential factors of vision was shown in tabular form. This committee recommended that "the proportionate value of the essential functions of one eye" shall be:

		Compensation Per Cent
Function A	$\left\{ \begin{array}{l} \text{(a) Industrial loss of visual acuity for} \\ \text{distance, or} \\ \text{(b) Industrial loss of visual acuity for} \\ \text{near} \end{array} \right\}$	= 50
Function B	Total loss of binocular single vision	= 25
Function C	Total loss of field of vision	= 25
	Total loss of all of the above functions or the award of industrial blindness for one eye	= 100

Chapman's table and the Chicago table consider 20/200 as industrial blindness. The New York State Medical Society committee recommends 20/320 as industrial blindness, and the committee of the American Medical Association holds that 20/220 represents this condition. These reports show painstaking, intelligent work, but if you compare them you find that they agree upon one point only—20/20 equals normal vision.

The New York State Industrial Commission has ruled that 20/100 is industrial blindness and the loss of binocular single vision is equivalent to the total loss of an eye.

Medical men cannot expect legislatures and compensation commissions to adopt a uniform standard for estimation of injuries when they cannot agree among themselves upon a standard for visual disability. We will all concede that human sight is a complex affair; but if we devise a table that tries to express all its complexities in cold figures, there will be no end to the discussion. What we really need is a simple table that will tell us the *approximate* visual loss to a worker, for instance, who has had both eyes burned with acid, and who has a right vision of 20/40 and a left vision of 20/70; or of one who has had a perforating wound of the right cornea and has right vision of 20/100 and a left vision of 20/20. Such a table would be a long forward stride in solving compensation cases if it has the backing of eye surgeons, and it would cover 75% of eye injuries. With a worker's central visual loss approximately determined, the question of his field of vision, binocular single vision and disfigurement would have to be left to the judgment and imagination of the commission. They are going to decide, anyway, according to their own ideas, right or wrong.

VISUAL DISABILITY OF ONE EYE

We are all willing and anxious to encourage a totally blind man, but we say little to hearten the man who has lost or

¹"Report of the Committee on Estimating Compensation for Eye Injuries." *Journal American Medical Association*, vol. 77, No. 21, Nov. 19, 1921, p. 1654.

partially lost the sight of one eye. Writers dwell upon what he has lost—color perception, depth perception, master eye, and what not. They would seem to condemn him to the coarsest and crudest work and stamp him “unfit.” I cannot feel that way about it. I think he has lost some of the luxuries rather than the necessities of sight. Generous Nature has given us two eyes, just as she has given us two ears, two lungs and two kidneys. She has given us a surplus, a reserve to be called upon in case of need. The man who has had an eye enucleated or is totally blinded and disfigured has suffered a real loss. He has lost his reserve vision and has received a cosmetic injury for which he should be compensated. The young man who has an unsightly eye has my very deep sympathy. But aside from the cosmetic injury and loss of reserve vision, has he really lost much of his industrial efficiency? I do not think he has.

I know of no kind of work that the man with one eye cannot do if he is properly encouraged and really wants to work. Great men have usually risen to greatness under more discouraging handicaps than the loss of an eye. Some of the companies I have been associated with did not require a preliminary examination before employment and I have often been amazed at the visual defects of some of the men and the good work they were doing. For example, a laborer who had been working on the street for fifteen years had a vision of 20/100 due to ulcers of the cornea in childhood. A janitor had a vision of 20/200 in the right eye and 20/100 in the left eye, due to chronic trachoma. A valuable foreman for years with the company was blind in one eye and had a vision of 20/50 in the other from recurring ulcers of the cornea.

NEED OF TESTING VISION OF WORKERS

Every man should have his eyes carefully tested before employment and a record made of the examination. This should be done for the information and protection of the employer, for practically every man who has his eye hurt will claim that this eye was a good eye before it was injured. It should be done also for the information and protection of the employee, for many men are unaware of their defective sight. I find that many of the older men wear no glasses at their work. As a consequence these men do poor work, which is costly to their employers, besides reducing their efficiency.

In rating for employment men who have defective vision, or other defects, I think the rating of the compensation law of the state should be strictly followed. If the law says he is unfit, then let him be classed as unfit or else placed at work in an occupation where his defect will be no handicap to him and where he will not be a danger to himself, to his fellow workers or to property. Almost every man with an injured eye is a

potential malingerer, many of them are actual malingerers, and have, in addition, a "compensation neurosis."

TESTING VISION IN INJURY CASES

In order to rule out malingerers and determine the actual condition of the injured eye, certain tests are necessary. The simpler the test the better. I never test the injured eye alone until after I have formed a fairly correct opinion of its vision. The method pursued in my office is this. I first determine the approximate refraction of both eyes by skiascopy without mydriatics. I then place the appropriate glass for both eyes in test frame with addition of a +2.50 sphere to that of the sound eye, put the test frame on the patient, turn on the chart light and ask him to read. I keep the patient under close observation at this stage and note any attempt to close either eye before reading. If he reads the chart, it will be with his injured eye. Even then you may safely assume a vision of one line more than he admits seeing. Afterward I refract both eyes under mydriatics. This method is as old as the hills, but it has served me well, and by its use it is so easy to demonstrate to the patient that he has been reading with his injured eye.

CONCLUSION

The consideration of eye injuries by compensation commissions constitutes only a part, though a very important part, of the work of these bodies. If the laws are administered inefficiently, or if there is undue delay in awarding compensation, dissatisfaction is recorded by both employer and employee.

As with vision, the success or failure of compensation laws depends upon three factors:

1. A legislature that will pass simple laws, fair alike to employer and employee; that will give the men who administer the law a generous salary, wide discretion in carrying out its provisions, and ample force to adjust cases promptly;
2. A governor who will appoint as commissioners men of high standing and free from partisan bias;
3. A commission that will administer the law in a spirit of even justice; that will expedite cases and do away with the delay in awarding compensation which is so costly to employers and so demoralizing to the injured man.

Under our form of government such a conception may be more or less an ideal, but why not strive for it?

BACK INJURIES FROM THE COMPENSATION STANDPOINT

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Efforts to secure reliable data and information from other states in regard to the compensation aspect of back conditions which have been construed as arising out of or in the course of employment, have been futile. No definite information is available. It will, therefore, be necessary to confine this paper to the experience arising out of contact with the Workmen's Compensation Act of Massachusetts.

Early in 1913, shortly after the Commonwealth of Massachusetts accepted the workmen's compensation laws, one heard often and read frequently about "that new Boston compensation condition known as 'Sacro-iliac Subluxation or Sacro-iliac Strain.'" The medical profession and others interested soon became aware of the increasing tendency to declare disabling low back conditions as being of occupational origin. If the occupation chanced to be industrial the diagnosis of occupational sacro-iliac involvement was most probable.

The number and variety of back conditions encountered in industrial medical practice which may have to a greater or lesser degree some causal relation to the occupation, have been limited only by the ability of the interested parties to establish sufficient theory or evidence to make the case eligible for compensation.

Back conditions which are of interest from a compensation standpoint necessarily have an actual or alleged causative relation to the occupation. In Massachusetts the law holds that aggravation of a condition which incapacitates or causes disability constitutes an industrial accident or an industrial disease, and is compensable.

The conflicting interpretations by the various industrial accident commissions and boards of the different states, as to what really constitutes an industrial accident, or rather a compensable condition, have had much to do with the present chaotic state and lack of uniformity of diagnosis and treatment surrounding back conditions in workers. A comparison of the workmen's compensation laws in various states shows that they differ markedly in their application to similar conditions.

The Massachusetts Industrial Accident Board has defined the term "industrial disease" as follows:¹

¹Report of Cases under the Workmen's Compensation Act, July 1, 1912, to June 30, 1913 inclusive, 1913, p. 521.

"The term 'Industrial Disease' and 'Occupational Disease' shall mean and include any ailment or disease caused by the nature, circumstances or the conditions of the employment."

Therefore, it is readily seen that in Massachusetts disabling back conditions, with few exceptions, arising in or making themselves manifest in the industrial worker during his hours of work, or alleged to have so occurred, can very logically be adjudged compensable either through causal connection with the occupation or through aggravation thereby.

The usual belated and unsatisfactory history of most of these cases is given by the worker about as follows:

"I have strained my back, my work is too heavy." Vague history, no definite time or place.

"I got a stitch in my back three or four days ago while lifting."

"About a week or so ago, while lifting, something gave way in my back and gradually got worse, did not feel it much at the time."

"While lifting or prying on a bar, three or four days ago, the bar slipped or somebody let go of a heavy weight and brought all the weight on me. Has pained more or less since; now can't work." Pain referred to sacrum.

Incapacity ensues, and every effort is made to connect the condition with the employment through the alleged injury. Such efforts are usually successful. Compensation is paid, treatment is instituted and every form of therapeutics applied. Some of the cases recover completely in a short time. The severity of the onset, the usually very acute pain and complete disability, do not always indicate a protracted convalescence. Many times the employee returns to work in three or four days after a most acute condition, which at the onset compelled him to remain in a cramped and deformed position, unable to move. Others with sub-acute onset improve slowly over a long period, but remain just short of full recovery, and are assigned some special or light employment. Others either show no improvement or never fully recover and constitute permanent total or partial disability cases. These latter cases usually have had every diagnostic facility and every known treatment, but without recovery.

In order that the factors which are present in low back disabilities may be brought to mind, and the relations and aggravations may be comprehended more easily, the conditions encountered will be considered briefly. The types of low back conditions most frequently encountered are:

1. Simple lumbago;
2. Chronic lumbago;
3. Traumatic lumbago;
4. Sacro-iliac relaxation or static lumbago;
5. Atrophic arthritis of spine;
6. Hypertrophic arthritis of lumbar spine;
7. Osteo-arthritis of sacro-iliac synchondrosis;

8. Malignant disease of lumbar spine;
9. Lumbar caries and the backaches of abnormal internal conditions;
10. Constipation;
11. Oxaluria;
12. Renal calculus;
13. Intra-pelvic disease.

A discussion of the first four disabilities of the back follows.

ACUTE LUMBAGO

The most common complication of this condition is sciatica. Some of the predisposing influences which must always receive due consideration are faulty habits of diet, exposure to extremes of temperature, damp clothes and certain occupations.

It may be confused with traumatic lumbago. Its most important differential diagnostic points are: Diffused tenderness over the lower back region, absence of trauma, swelling and ecchymosis. X-ray examinations are always negative, while in traumatic lumbago the X-ray frequently shows definite injury.

It is differentiated from sacro-iliac strain, which is usually definitely localized and unilateral. Certain employments will also increase sacro-iliac strain, but will have no influence on acute lumbago.

CHRONIC LUMBAGO

This usually follows one or more acute attacks and should be differentiated from static conditions of the spine and atrophic and hypertrophic arthritis of the lumbar spine. Certain symptoms of indigestion, tonsilitis, some forms of tuberculosis and neuralgia of the lumbo-abdominal region may be confused with this condition.

TRAUMATIC LUMBAGO

This is a strain, contusion or rupture of the lumbar muscles. It usually affects males and follows some sudden or prolonged arduous work. Its onset immediately follows the direct injury or effort. Pain is intense, disabling, localized, unilateral, often referred to the iliac crest. It should be determined early whether the ligaments, bones or joints are involved, as the proper treatment will depend upon such information.

It should be differentiated from fracture of the spine which usually shows, in addition to fracture symptoms, nerve involvement, loss of sphincter control, etc.; and it should also be differentiated from acute and chronic lumbago.

SACRO-ILIAC STRAIN

In my experience this disabling back condition is met with frequently in industrial medical work, and from the workmen's

compensation point of view is the most perplexing and complex of all the back conditions encountered. There are two recognized types, traumatic and mechanical or static. The traumatic type, which involves stretching or laceration of the sacro-iliac ligaments, is induced by a fall or other sudden strain. The mechanical or static type usually develops on account of posture or some abnormality in the structure or position of the sacrum and is often spoken of as a relaxation. Spinal curvature, certain foot abnormalities, and other factors related indirectly to this region may also have an influence upon its occurrence. The symptomatology of both conditions is similar, although it may be more acute and severe in the traumatic type; for brevity both types are jointly considered. It is of primary importance that these dislocations be recognized and reduced before improvement can be expected.

Sacro-iliac strain may be confused with acute lumbago, sciatica and hip disease. It is differentiated from lumbago by a more sudden onset, localized pain or tenderness, almost unilateral in character and aggravated by the recumbent position. Fixation of the pelvis relieves pain in sacro-iliac strain, but does not relieve the pain of lumbago. Mobility of the sacro-iliac joint can frequently be demonstrated in sacro-iliac strain, never in lumbago. The duration of lumbago is brief, usually a few days, while in sacro-iliac strain, recovery is sometimes a matter of weeks or months.

It is differentiated from sciatica, which may occur in persons not subject to occupational strain, and is often preceded by lumbago. Tenderness in sciatica follows the course of the sciatic nerve, radiating down the leg. Sciatic pains are more spontaneous and usually relieved by recumbency. In sciatica, there is no limited joint motion; such motion may be demonstrated in sacro-iliac relaxation. The following objective signs are often present in sciatica, but absent in sacro-iliac strain: muscular wasting, anaesthesia, and loss of Achilles reflex.

In hip disease there is muscular spasm, tenderness over the hip and trochanter, muscular wasting, atrophy, local swelling and other positive signs.

The principles of treatment of sacro-iliac relaxation involve:

1. Restoration of the normal relationship of the joint surfaces;
2. Retention of the bones in the corrected position;
3. Removal of the cause, when this is possible.

Moorhead¹ in discussing treatment says:

"In the acute variety, the parts are to be given rest by incasing them in straps of adhesive or plaster of Paris, passing completely around the pelvis. After such a dressing has been worn a fortnight, a corset of leather or elastic can be substituted and gradually dispensed with.

¹Moorhead, J. J., "Traumatic Surgery." W. B. Saunders, Philadelphia, 1917, p. 120.

"In chronic cases, the true source must be ascertained and if relaxation is alone at fault, some form of molded leather or metal corset will be effective in the vast majority of cases."

CONCLUSION

The probable causes of the various back conditions discussed in this paper may be briefly summarized as follows:

First, and of greatest importance, is the general health. Normal individuals in good health, with no postural abnormality, to my mind seldom have low back injuries of occupational origin except in severe accident cases. Faulty posture and acute illnesses may predispose the individual to low back pains, which, however, are of short duration.

Second, it is impossible to differentiate clearly between industrial and non-industrial low back conditions, as there are so many non-industrial contributing factors which in themselves predispose to the possibility of industrial aggravation.

Each case must be classified according to all the information and data obtainable, and even then mistakes are bound to occur. Viewing the situation from the compensation standpoint only, and having in mind interpretations of the various workmen's compensation laws, it seems probable that in the future all disabling back conditions arising in industry will be more extensively adjudged to be of occupational cause or aggravation. The condition may or may not in itself be occupational in origin, but it becomes occupational and compensable through aggravation by some slight effort or injury during employment.

There is much confusion in the minds of those interested as to where a purely non-industrial back condition ceases and the occupational aggravation begins, and how these should be differentiated from a remunerative or compensation standpoint. The question is difficult of solution and probably will never be definitely settled.

It seems to be the purpose of those administering the workmen's compensation laws to compensate all low back disabilities, and to attribute them either to a definite cause or aggravation of a pre-existing condition. It is usually assumed by industrial boards that the employee was working up to a certain time; that something happened to his back, after which time he was unable to work. Disability ensued and compensation is allowed. Light work is recommended pending recovery. Or an impartial physician renders an opinion on the history as given by the employee to the effect that the injured is or is not in condition to resume employment.

The only solution of these cases is prevention, and preventive measures cannot be applied in the absence of knowledge of the need for their application. The predisposing static conditions may be recognized at time of employment if physical examination of applicant is made. Lordosis of the spine and other

static conditions of posture, flat feet, etc., would lead one to believe that this type of individual, with the addition of some systemic sub-normalities, would constitute a candidate for back disability through slight exertion during employment. Employment of individuals of this type should be very carefully supervised, and they should be placed where there is no opportunity for heavy lifting, extreme exertion, or where they would be called upon to maintain one position for an extended period. These static or postural conditions are all noticeable, and easily determined when the examiner is putting an applicant through the usual exercises designed for this purpose.

Every form of safeguard should be thrown about these pre-disposed individuals for the purpose of protecting them against undue effort under unusual conditions. The prime object in the prevention of these conditions is the safeguarding of the physically defective and the building up of their general physical condition to the end that they may be safely employed amid surroundings as free as possible from danger arising from their physical defect.

HERNIA FROM THE COMPENSATION STANDPOINT

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In the consideration of inguinal hernia by compensation commissions it is necessary to keep in mind constantly that both the employer and employee have rights which must not be lost sight of or violated. Conclusions should be based upon facts as developed by the best thought of the medical profession of this country, so that when a case is closed the injured worker may be returned to society a useful and productive citizen. Differences of opinion as to the cause or etiology of inguinal hernia have been the chief reason, I believe, for the multiplicity of methods pursued by compensation boards and courts in the settlement of these cases.

The cause of hernia has been well described by Dr. W. B. Coley of New York:¹

"In most cases of oblique inguinal hernia, the weight of evidence is very strong, that the presence of a congenital or preformed sac, or open vaginal process of peritoneum extending into the canal, is the chief predisposing cause of hernia. It is quite true that this sac for a long period may be only a potential sac, and that other causes play a part in the formation of the actual hernia; among these are the enlarged external ring, imperfect development of the internal oblique muscle, and an abnormally large slit in the transversalis fascia opposite the internal ring."

This opinion by Coley is accepted by a majority of the medical profession, yet those of us engaged in industrial work know that in many people hernia appears for the first time while they are engaged in lifting, bearing heavy burdens, by being struck in the inguinal region, or by falling. Trick,² of Buffalo, draws the following theoretical deductions applicable to such cases:

"1. The most potent force in the production of abdominal hernia lies latent inside the bowel, and is applied from within outward, i. e., increased intravisceral pressure due to concentric compression exerted by the muscles of the abdominal wall.

"2. Developmental defects do not cause hernia, but they represent the sites of potential hernia, and are probably the result of force applied during intra-uterine life."

Thus, if we compensate all cases of hernia as they arise, we can do so only upon the assumption that all working men are normal in their inguinal region at the time they assume laboring

¹"Hernia," *Progressive Medicine*, June, 1920, Vol. 2, No. 6, p. 39.

²Trick, Harry R. "The Dynamics of Abdominal Herniæ." *New York State Journal of Medicine*, May, 1919, Vol. 19, No. 5, p. 166.

responsibilities. This is not believed by the medical profession to be a fact.

Nevertheless, there are cases that become aggravated as they go through life, possibly during working hours and possibly during the so-called daily recreation periods away from work. Our experience has shown the progressive development of hernia as indicated by our physical examinations.

At first, we have enlarged rings only, followed later by an incomplete hernia, and lastly a complete hernia. In our experience of approximately 121,000 examinations of the inguinal region, complete or incomplete hernia has been discovered in 2,403 cases, or about 2%. When we began these examinations, and had fewer cases, our percentage was 4½%.

It has been contended by some physicians in plants where physical examinations are required, that all workers with hernia should be excluded from employment. Such physicians felt that there was a diminished efficiency on the part of the worker, and an increased risk due to the possibility of aggravation and strangulation of the hernia. I know of no figures that accurately measure the decrease in ability to work at par, nor the harmfulness to the worker, but I do know that during a period of six years among 894 men working with herniæ in our plant, but two became strangulated. Both cases were successfully operated by Dr. Dobbins and myself. With a properly organized industrial medical department, the danger of meeting a fatal case of strangulated hernia is, in my judgment, remote. As a preventive of strangulation and aggravation, men with hernia should be placed upon selected jobs and should wear a truss.

My records show 128 cases of hernia operated on by Dr. Dobbins or myself. In these 128 cases there were but three recurrences. Recurrence not only depends upon the skill of the operator, but also upon the kind of work the patient does subsequent to the operation. The variation in recurrence will run from 1% to 8% among cases operated on by the average surgeon.

A careful analysis of our 128 cases shows that one case died of a double ether pneumonia; the average number of days away from work, was 46.2; the average number of days in hospital, was 17.5.

The causes of the herniæ were given by patients in the following order of frequency: lifting burdens in excess of 150 pounds; pulling heavy loads; contusion in the inguinal region; slipping or twisting.

Our standard in an uncomplicated case has been that the patient may expect to be in the hospital for two weeks following the operation, and in six weeks can return to the same work he was doing at the time he claimed his hernia was acquired. This standard has been evolved from experience and has served us well. It has been our experience that at the operation we almost never find what is described as an acute traumatic hernia.

Before we discuss the relation of these facts to compensation, I wish to draw the following medical conclusions to aid us:

1. Though an individual may have a poorly constructed inguinal canal, or weak muscle development, and a potential hernia, the hernia may never become visible until adult working life. This type of hernia is very common, and that caused by direct violence very rare.

2. In making physical examinations by the usual method, if a hernia is diagnosticated the findings are positive, but if no hernia is found, the diagnosis is not necessarily negative.

3. A worker with hernia supported by a well-fitting truss can be placed upon a selected job without danger to himself or risk to the company.

4. Operation should always be advised in place of a truss when the patient's physical condition warrants it.

As a rule I am sure that compensation boards have taken a much fairer stand in relation to awards for hernia than have the courts. In looking over the methods of compensating for hernia by different states, there are those which are true to the present known medical truths and others which wander somewhat afield. This conflict is due, I believe, to the assumption that the inguinal region is normal in all men, which assumption unfairly penalizes employees and employers.

In practically all states having compensation laws the claimant has to prove:

1. That there was an injury resulting in a hernia;
2. That its appearance was accompanied by pain;
3. That the hernia immediately followed the accident and that it did not exist prior to the accident.

While these three principles are excellent, they offer no protection to an employer who does not require a physical examination of his employees. The presence of pain, existence of a hernia, or the occurrence of an accident as slight as some of our cases claimed, are often incapable of proof. As a result, boards have tried to add features making proof more easy and reliable. Witness New Jersey, which requires in addition to the above proofs:

1. Such prostration that employee has to cease work immediately;
2. Symptoms so severe that employee notifies employer immediately; or
3. An injury of such severity as to require the attendance of a licensed physician within twenty-four hours.

Assuming that it is the real accidental hernia acquired in the course of employment in which compensation boards are interested, it would seem but fair that the employer should be able to disprove a claim by the evidence of competent witnesses. This can be done only if the claimant is injured severely enough to feel pain in connection with a working accident that is known

to be capable of producing a hernia, and to which he calls the attention of a foreman or fellow worker. In addition, it should be compulsory for an injured employee to report to a qualified physician within forty-eight hours after injury, so that his case may be reviewed by a competent specialist. In this way only can cases of previous hernia be disproved and the malingering now so evident be brought to a termination. A hernia in process of formation over a long period of time as the result of congenital defect is not an accident, but should be classed as an occupational disease. No single act produces such a hernia; but multiple minor intra-abdominal pressures at work, at home, or elsewhere, gradually force the peritoneum, followed by intestine, through the inguinal rings to complete the hernia.

Many industrial accident boards provide for operative treatment if the patient is physically able to undergo an operation. This I think is wise, for the employer, if he is going to pay for treatment, has the right to demand that the best treatment that science can furnish be selected. Beyond a doubt this is best for the worker also. It is now believed by competent medical men that a truss cures nothing, and is at best but a makeshift. The injured worker physically unable to undergo an operation because of age or disease should be provided with a truss at the employer's expense, but only at the discretion of the board, whose opinion should be formed from expert medical advice. In addition he should be paid compensation for such lost time as is due to pain in the inguinal region caused by the time necessary to become accustomed to wearing a truss. In no event should this time exceed three weeks. Operation should be the rule and insisted upon; a truss should be the exception.

The matter of money award should be fixed by known medical facts and results. If we can do hernia operations with an average lost time of 46 days, a man should be paid for his actual loss of time not to exceed 12 weeks. The extra time is allowed for the occasional case of infection that will occur. In cases of recurrence the same awards should prevail. In cases of strangulation the same awards should be paid, but if death ensues as the result of strangulation, a regular death rate award is fair. If a patient refuses an operation he should not be compensated during the time of refusal.

Lastly, all states should have a provision in their law that any employee with a hernia could sign a release from future complications to, or aggravation of his hernia, provided it did not include strangulation that might occur while at work. This ruling would make an employer more willing to accept workers with hernia, and would materially aid those who have such defects to obtain work.

OCCUPATIONAL DISEASES FROM THE COMPENSATION STANDPOINT

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Certain manufacturing processes involving the use of poisonous products have been known, since their inclusion in industry, to produce definite symptoms among workers exposed to them. A few such processes occur in the smelting and refining of lead, the manufacture of hats, the making of pottery, etc.

As our knowledge of plant processes has increased, and as public health activities have been extended to cover many forms of industry hitherto ignored in such work, the tendency has been to include an increasing number of pathological symptom complexes under the heading of diseases of occupation. As study of these conditions has progressed, and as our knowledge of their occurrence and cause has widened, it has been seen that, barring a few specific conditions, many of the so-called occupational diseases could be and frequently were acquired outside of industry.

Many investigators and some official bodies have attempted to define occupational diseases. While there is little uniformity in such attempts, two such definitions may be quoted as follows:

"Occupational diseases may be defined as maladies due to specific poisons, mechanical irritants, physical and mental strain, or faulty environment resulting from specific conditions of labor."¹

Another definition is:

"Diseases of occupation may be defined as injuries and disturbances of health contracted in industrial pursuits, and other vocations in life, as a result of exposure to toxic agents, infectious organisms or other conditions inimical to health."²

At the present time, it is generally conceded that there is only one disease that is peculiar to the occupation in which it is found, viz., caisson disease. Practically all other diseases, including those specified in certain of the state workmen's compensation laws, may be contracted outside of and bear no relation to the employment.

The growth of the idea of compensating workmen for diseases which were presumed to bear some relation to occupation followed closely upon the enactment of laws prescribing compensa-

¹Thompson, W. Gilman. "The Occupational Diseases." D. Appleton & Co., New York, 1914, p. 1.

²Kober and Hansen. "Diseases of Occupation and Vocational Hygiene." P. Blakiston Sons & Co., Philadelphia, 1916, p. 417.

tion for accidents. The inclusion of so-called occupational diseases in these laws has been much slower than the extension of the compensation principle in general. While the compensation laws have been in force for ten or twelve years, and have now been extended to forty-two states, the provision for compensating occupational diseases has become established in only a few states.

The compensation laws of twenty-seven states contain references to occupational diseases. In only three states¹ has an attempt been made to list the diseases which are compensable. New York and Minnesota each have a list of twenty-six diseases, including sequelæ of twelve, which are compensable, while in Ohio this list is confined to fifteen diseases without mention of sequelæ.

LIST OF OCCUPATIONAL DISEASES IN:
New York and Minnesota

1. Anthrax.
2. Lead poisoning or its sequelæ.
3. Mercury poisoning or its sequelæ.
4. Phosphorus poisoning or its sequelæ.
5. Arsenic poisoning or its sequelæ.
6. Poisoning by wood alcohol.
7. Poisoning by nitro and amido-derivatives of benzene (dinitrobenzol, anilin, and others), or its sequelæ.
8. Poisoning by carbon bisulphide or its sequelæ.
9. Poisoning by nitrous fumes or its sequelæ.
10. Poisoning by nickel carbonyl or its sequelæ.
11. Dope poisoning (poisoning by tetrachlormethane or by any substance used as, or in conjunction with, a solvent for acetate of cellulose) or its sequelæ.
12. Poisoning by *gonioma kamassi* (African boxwood) or its sequelæ (in Minnesota only).
13. Chrome ulceration or its sequelæ.
14. Epitheliomatous cancer or ulceration of the skin or of the corneal surface of the eye, due to tar, pitch, bitumen, mineral oil, or paraffin, or any compound, product or residue of any of these substances.
15. Glanders.
16. Compressed air illness or its sequelæ.
17. Ankylostomiasis.
18. Miners' nystagmus.
19. Subcutaneous cellulitis of the hand (beat hand).
20. Subcutaneous cellulitis over the patella (miner's beat knee).
21. Acute bursitis over the elbow (miner's beat elbow).
22. Inflammation of the synovial lining of the wrist joint and tendon sheaths.
23. Cataract in glass workers.
24. Zinc poisoning (in New York only).
25. Formaldehyde and its preparations (in New York only).
26. Hydro-derivatives of benzene (in New York only).

Ohio

1. Anthrax.
2. Glanders.
3. Lead poisoning.
4. Mercury poisoning.
5. Phosphorus poisoning.
6. Arsenic poisoning.

¹Minnesota, New York, Ohio.

7. Poisoning by benzol or by nitro and amido-derivatives of benzol (dinitro-benzol, anilin and others).

8. Poisoning by gasoline, benzine, naptha, or other volatile petroleum products.

9. Poisoning by carbon bisulphide.

10. Poisoning by wood alcohol.

11. Infection or inflammation of the skin or contact surfaces due to oils, cutting compounds or lubricants, dusts, liquids, fumes, gases or vapors.

12. Epithelioma cancer or ulceration of the skin or of the corneal surface of the eye due to carbon pitch, tar or tarry compounds.

13. Compressed air illness.

14. Carbon dioxide poisoning.

15. Brass or zinc poisoning.

Twenty-four other states take note of occupational diseases in their laws, but in different ways. The laws of fourteen states¹ are so worded that "injury" and "personal injury" include only such diseases or infections as result from the injury. In three states² in addition to the specifications mentioned above, occupational diseases and contagious or infectious diseases are specifically excluded. Four states³ include diseases peculiar to occupation but exclude contagious, communicable or mental diseases, while in three states⁴ the law specifically provides for the exclusion of diseases of any kind.

It is felt by students of this question that the practice of listing certain diseases and saying that these diseases only shall be compensated is one not to be recommended. Occasions may arise where disease conditions other than those listed in the law will manifest themselves and should be compensated. On the other hand, if an attempt is made to embrace within the law all possible diseases that may arise out of or in the course of occupation, the way will be opened for ceaseless litigation. Moreover, such measures would open the way to a vast increase in the number of malingerers seeking to take advantage of the favorable provisions of the compensation laws.

With the extension of compensation laws there has been shown a tendency to claim compensation for conditions more and more remote from the primary cause of the injury. In like manner, if compensation for specific diseases is extended, there will doubtless be a similar attempt to obtain compensation for diseases having little or no relation to working conditions.

The provision in the laws of New York and Minnesota that sequelæ shall be compensated has also been subject to criticism. It is well recognized by medical men that it is impossible to prove absolutely that subsequent pathological conditions have no connection with a previous illness. Or to state it differently, many diseases or cases of ill health occurring subsequent to some specific illness may exhibit certain symptoms which would

¹Delaware, Georgia, Idaho, Indiana, Iowa, Kentucky, Maryland, Oklahoma, South Dakota, Tennessee, Texas, Utah, Virginia, Wyoming.

²Louisiana, Missouri, Nebraska.

³California, Connecticut, Pennsylvania, Wisconsin.

⁴Alabama, Montana, Washington.

indicate a more or less direct connection between the two conditions, but which may occur independently of one another. Physicians often honestly differ in their opinion as to the relation of one condition to the other, and thus confuse the true relation of these conditions in the minds of lay persons who are invariably called upon to decide these questions.

If it is necessary to use the term *sequelæ*, it would seem advisable to place a time limit upon each pathological condition arising subsequent to the original illness, beyond which compensation will not be permitted, as otherwise the field is opened to a large degree of controversy and unlimited interference.

It is interesting to note that in the states of New York and Minnesota, where the number of workers engaged in mining operations is very small, five of the twenty-three diseases to be compensated apply largely to miners' occupations, being seldom encountered in other lines of work. On the other hand, in Ohio, which has a large mining population, no reference is made to the so-called mining group of occupational conditions.

In the decisions of industrial commissions in certain states, cases of pneumonia¹ following exposure during employment have been classed as occupational diseases, and compensated accordingly. Typhoid fever² contracted from polluted drinking water served to workers in a factory has been compensated as an occupational disease. When these and similar diseases occur as a result of undue exposure in connection with a man's employment, he should be compensated therefor in the same measure as for certain other conditions which are much less serious in making inroads upon his health. For this reason it would seem that the preferable method of dealing with compensation for occupational diseases would be not to designate a specific group of conditions, thus automatically excluding all other conditions, regardless of their method of occurrence, but to make the law read so that the industrial commission has the right to consider each case upon its merits, and, if the claim is proved, to award suitable compensation for the condition found. Of course, in such a scheme of handling this question the necessity for unbiased and authoritative medical opinion is increased over that now required in the administration of many workmen's compensation laws. This, however, would be a forward step in the settlement of these problems.

On the whole, it is to be expected that as time goes on the consideration of claims for compensation for occupational diseases and poisons will become less, owing to the fact that improvement in construction, equipment and operation of industrial units will make for safer operation with diminishing hazards both to the health and physical well-being of workers. As management becomes convinced of the value of preventive

¹Industrial Commission of Wisconsin, Fourth Annual Report, 1915, p. 20.

²Industrial Commission of Wisconsin, Sixth Annual Report, 1917, p. 72.

measures they will be installed more widely. In the past much has been taken for granted regarding the harmfulness of many substances used in industrial manufacturing processes and theories have been constructed upon insufficient foundations of practical knowledge.

As our knowledge of industrial processes and their influence upon the human organism increases, and as the medical department becomes more firmly established as an integral part of industrial operation, it will be possible to place workmen and safeguard them so that danger of poisoning or contraction of disease will be reduced to a minimum.

It will be impossible, however, to identify beforehand the worker who maintains a personal idiosyncrasy against certain conditions or substances. This group of individuals can only be detected through the unfortunate method of succumbing to unfavorable substances with which they may be thrown in contact. For the general group of occupational workers the growing tendency to physical examinations before employment and subsequent periodic re-examinations after employment will enable a more scientific placement of workers, which will tend to a lessening of strain and exposure to influences inimical to their well-being. Great strides have been made during the past ten years in the protection of workmen, and even greater results may be expected in the years that are immediately ahead.

REHABILITATION OF THE INDUSTRIALLY HANDICAPPED

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The rehabilitation of the industrially handicapped is not merely a question of responsibility or duty on the part of the industries, but should be considered from the much broader viewpoint of humanity and from that of the way in which the industries can be of the greatest assistance in this work, thereby doing their share in enabling the handicapped again to become useful and productive members of society.

The old idea was that a man handicapped by the loss of a leg or an arm, or with some other permanent disability, was a cripple and that consequently his days of gainful employment were over. With the present development of a deeper sympathy and a broader sense of responsibility on the part of the industries and the public, this pernicious idea is fast passing away. It was very distinctly the policy of the reconstruction agencies after the late war to minimize the use of the term "cripple." It was and still is synonymous with the type of patient who sits disconsolately in a wheel chair at the window, receptive of all the sympathy he can get, or of the less fortunate, selling shoe laces or lead pencils on the street corner. This change of thought has been more rapid since the war, owing to the results achieved by different countries in the rehabilitation of their wounded soldiers, and their return to useful occupations. Before the war this change of thought was taking place to a large extent on account of the marked increase in industrial activity which brought about an increase in the number of injured, notably in France and Belgium, where trade schools had been established for the retraining of men who had been injured in the industries. It has been within the last decade only that the states, through the workmen's compensation laws, have assumed responsibility in the payment of compensation; and only in a very few states has there been any organized effort to give the permanently disabled worker a new start in life, thereby enabling him to earn a livelihood for himself and family.

In considering the industrially handicapped, we must think not only of the employee who has been injured, but also of the one who is suffering from chronic disease, such as tuberculosis, heart disease, etc. It is just as important to stop a man from doing work that is proving disastrous to his health and perhaps to his fellow workmen as it is to take care of an employee who has been injured within the plant. If industry does

not do this, it is shirking its moral responsibility and failing to accept its opportunity in helping to preserve the health of the nation.

This phase of preventive health work and of rehabilitation of those handicapped by disease can be accomplished only by periodic physical examination of all employees, including examination at the time of employment. This can be done at very small additional expense to industry. In this way danger signs can be seen and conditions arrested which, if not detected, will soon cause permanent disability, from which the worker cannot be rehabilitated, and as a result of which he may later become dependent upon private or public charity. To keep the man from breaking is preventive work which, after all, is what we should strive for, both in accident prevention and health service among employees. Good health is the greatest factor in the prevention of accidents. Very often we learn after an accident that the injured was not feeling well at the time the accident occurred, and was careless.

The extent to which any particular industry may do rehabilitation work among its employees depends largely upon the type of the industry and the number of employees; hence, in order that all handicapped workers may be reached, it is very necessary that an organized movement be carried on among industries in conjunction with each state department of labor and industry and department of health. One of the most significant bills passed during the last session of Congress was the Industrial Rehabilitation Bill, the administration of which was placed with the Federal Board of Vocational Training. It is not the idea that federal funds only should be used for rehabilitation work, but rather that each state should provide funds for this purpose, the federal government assisting. This is as it should be, for the state will reap the benefits from those who are rehabilitated, as will each individual industry that contributes to the support of this work.

Rehabilitation work is now being carried on by the departments of labor and industry of several states through the development of clinics where the handicapped man receives all therapeutic treatment and mechanical devices, after which, if it is not possible for him to resume his former occupation, he is given further opportunity for the training needed to fit him for a new occupation. The expense of this has been carried largely by the state, with the industries taking no part; in consequence, owing to the lack of funds, the number of men reached and helped has been limited as compared with the total number that need to be reached. As has already been mentioned, it is very necessary, while training the man, to provide for his dependents as well as himself. The amount of money required for this would be small compared to the advantage of his being restored to an earning capacity. In the

maintenance of this work the costs should be shared equally between the state and those industries and public utility corporations which do not maintain their own rehabilitation clinics.

It has been estimated by R. T. Fisher, chief of the Federal Board of Vocational Education, that "any seriously disabled man who can be rehabilitated will have his earning capacity increased by a total of \$12,500 for the remainder of his life, and that his increased productive value to the nation will reach \$50,000. Assuming that not more than one-half of the permanently disabled would require retraining, we would have an increased production to the nation of two and one-half billion dollars."¹

A great step toward securing still further cooperation from the industries in employing the physically handicapped would be for the state to carry the insurance of these men, because the state would benefit greatly, not only through the increased earning power of the insured, but through the lessened number of those dependent upon state aid. There is no doubt but that men who have lost an arm, an eye, or a leg, are greater hazards in the majority of the industries than are those not thus handicapped. While most industries undoubtedly endeavor to take care of their own physically handicapped, it is at times rather difficult to do so, because of the seasonal nature and varying volume of their work. It would, therefore, seem only logical to have the state assume the obligation of insurance for the physically handicapped, if the industries on their part undertook to provide work for them.

The organization of rehabilitation clinics by the state, with the aid of the industries within its borders, seems to be the most logical way of reaching those who need help, and who, if not reached, will remain permanently disabled. An industry employing over 10,000 workers should have its own rehabilitation clinic. Such an industrial clinic could accomplish much by working in cooperation with the state clinics. Cases so often seen on the streets are those who have not had the advantage of such treatment, and as a rule, they are eking out an existence by selling pencils or holding their hats at our very doors.

These clinics should be available for the diagnosis of all medical conditions which exist in the opinion of the man or of his family physician; there should be a place where a man may receive at moderate cost, or even free, a complete physical examination, and have the report made to his physician, who may give him the necessary treatment, or where it may be ascertained whether a change of work would be very beneficial to him. There is a very large class of people at the present time who cannot afford modern diagnostic methods and yet do not ask for free work.

¹"Restoring Cripples to the Industrial Ranks." *Current Opinion*, Oct., 1920, p. 534.

In the administration of these clinics, it is important that someone be in close touch with the employment departments of all the industries within the area which the clinic serves, and that a survey be made to show where a handicapped man might be employed. In this way a great many workers may be placed in useful service without retraining.

In one industry it was found that there were ninety-two different occupations that a one-legged man might fill, and sixteen where men with both legs amputated might be employed. The same sort of analysis can be made of positions suitable to arrested cases of tuberculosis or certain heart affections. A man who is compelled to change his occupation because of a physical handicap, should, if possible, be trained in a new occupation that either directly or indirectly bears a relationship to his former occupation. This has been found a very marked help in adjusting the mind of the man, and can be worked out in practically all disabilities.

A handicap usually throws a man into a state of extreme discouragement. The loss of a hand or an arm or a leg seems to the formerly able-bodied man an insuperable obstacle to his future economic activity. He has known and seen cripples, and he feels at once that nobody wants a cripple.

Most of the physically handicapped who have succeeded under unusual difficulties have done so largely as a result of their own efforts. There is nothing that will give a man an idea that he is disabled for life as will long hospitalization with nothing to keep his mind engaged. At the beginning of his disability, while he is still in a hospital, his mind should be stimulated to creative work, for on his mental attitude his rehabilitation will largely depend. This stimulation can be accomplished by the introduction of occupational therapy in all hospitals where industries may have connections, and will serve both to keep the man in an optimistic frame of mind and to shorten his period of disability. Work of this kind can be carried out on all hospital cases, whether permanently crippled or not. When discharged from the hospital under such conditions a man is in a very much more susceptible frame of mind for taking up suitable work, and he is ready to receive further treatment and necessary training to make him a productive unit of society.

To accomplish this result continued medical and surgical care must be given until the maximum improvement in his physical condition is attained. We must use every therapeutic aid available, such as physiotherapy, occupational therapy, vocational training, and any other agency which may serve to hasten his recovery. It is very important that these agencies be employed as soon as his physical condition permits and before he becomes a chronic invalid. When he is discharged from a hospital he should be sent immediately to the clinic nearest his

home, where he may receive further necessary treatment, be retrained, or placed in a suitable position.

The following cases from the experience of our own organization are only examples of what we may expect from coordinated rehabilitation work among employees.

G. W. O. met with an accident in the yards, losing both his legs below the knee. At that time he was making from 18 cents to 35 cents an hour. As soon as possible he was fitted with artificial legs, and as he did not have a great deal of education, he was taken into the shop and trained to make piston leathers, for which work he received 45 cents an hour.

G. M. P., a machinist, lost his right arm just below the elbow by a shell machine. He was provided with an artificial arm and brought back into the shop in a clerical position. At the same time he attended the Westinghouse Technical Night School at East Pittsburgh, taking a course in engineering. His wages have been higher since the accident.

L. E. O., machine helper, age 16, lost his left arm midway between elbow and shoulder while working on a milling machine. He was provided with an artificial arm, sent to Technical Night School and given a clerical position in the shop. His wages have been more than before the accident. He is now able to do drafting, and when he completes his course will have a technical education.

During 1921 our company was able to return to suitable employment 25% of all tubercular employees found within the plants, after they had received treatment, and their condition warranted such action. This would have been impossible if these cases had not been found in the beginning of the disease.

The plant physician is the only person who can tell whether or not a man is physically able for the work which is expected of him, and it is his duty to assist the handicapped to obtain suitable work by placing them in the best possible condition to carry on without detriment to their physical well being.

An admittedly conservative estimate of the yearly economic loss to injured wage-earners resulting from industrial accidents has been compiled by Commissioner Charles H. Verrill of the United States Employees' Compensation Commission.¹ He estimates the number of accidents resulting in temporary disability at not less than 2,500,000 a year; the number of permanent total disabilities at 100,000, of which 72,000 are on account of dismemberment, or total loss of use of some member. Assuming, also conservatively, an average daily wage of \$2.50, with a discount of one-third to express present values, Commissioner Verrill estimates that the yearly losses in working days and in wages are as follows:

¹*American Labor Legislation Review*, Vol. 2, No. 1, March, 1922, p. 13.

	Working Days Lost	Wages Lost
Temporary disabilities.....	37,710,000	\$94,275,000
Permanent total disabilities.....	9,762,000	16,270,000
Dismemberment and total loss of use of member.....	66,600,000	111,000,000
Other permanent partial disabilities....	12,936,000	21,560,000
	127,008,000	\$243,105,000

These totals may now be multiplied by three and we will have an estimate of working days and wages lost by sickness, which, together with accidents, would be 508,032,000 lost days, and would represent \$1,092,420,000 lost in wages and consequently in production. If even 50% of this were salvaged by a coordinated movement by industry it would mean more than could be estimated to the health and prosperity of the nation. Industry would be doing its share and reaping its benefit.

THE PART OF INDUSTRIAL MANAGEMENT IN AN INDUSTRIAL MEDICAL PROGRAM

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The Medical Department in industry is designed primarily for the supervision and care of the health of the workers. The use of its facilities by executives and operating officials is generally optional, but the workers are quick to sense the place which the medical department holds in the estimation of the management by the use which the latter makes of it. If management assumes a tolerant attitude only, and is slow to cooperate in the work which the medical department is doing, aside from the mere curative treatment of injuries and sickness, little progress will be made in securing the hearty cooperation of the working force. Under such conditions the workers will use the medical department only as they will be required to use it, and will not make it, as it should be made, part of their own industrial life, conscious that it is designed for the bettering of their industrial, home, and community welfare.

After management has decided that medical work should be installed and conducted in an industrial organization, the first and most important task is the securing of a capable physician to direct this work. The management which follows the short-sighted policy of employing the medical man it can obtain most cheaply, is sure to get as much ability and professional skill as it is willing to pay for and no more; and it may even find that by such a policy it has done more harm than good. In industrial work second-rate physicians are a menace as great as, or even greater than are second-rate executives of any other type.

Aside from any humanitarian aim it should be the policy of the industrial manager, as a good business proposition, to place a high grade physician in charge of the medical work, since his value from an economic standpoint is predicated largely upon his ability by skillful and adequate treatment to reduce workmen's compensation charges, and loss of production time due to accidents. Inadequate or improper treatment of injured or sick workers by a poorly trained and inefficient physician will unnecessarily prolong absence from work, increase the amount of compensation to be paid, and often add the further expense of costly rehabilitation work before those who have suffered injuries are able to return to productive employment.

For these reasons and others that are obvious, it will be found to be ultimate economy to secure capable physicians to function in industry, and capability in this connection must comprise, in addition to professional skill, a pronounced ability to understand and properly to deal with human nature. Similar considerations should actuate management in selecting nurses and other members of the medical staff, and the important fact must not be lost sight of that the personality of the members of the medical department, and foremost, of the physician in charge, is of very great importance in the successful conduct of medical work in industry.

Having secured the right personnel at adequate financial compensation, and having given it the necessary tools to work with, and the proper environment in which to function, it will soon be found that its satisfactory work will weigh materially in the minimizing of compensation costs and production time losses. The saving which a capable physician can effect will soon justify the seemingly large initial expenditures for a properly equipped medical department.

In order that the medical department may appeal to the workers and function efficiently, it should occupy adequate space in cheerful quarters; it should be properly located in the plant, and its equipment should be the best available for the work to be done. Of course, the adequacy of space, equipment, and personnel must be relative to the size of the plant and its requirement for medical supervision according to the hazards of the work, the number and type of people employed and the proximity of hospitals and practicing physicians and specialists. In the beginning, slight under-organization is preferable to over-organization, so that the medical department may grow into the confidence of the workers and of management, and may expand with the growth of the plant, rather than stand out so prominently at first as to arouse suspicion and unfavorable reaction.

The medical department which is given inadequate space and equipment, or is located in an out of the way part of the plant, will be unable to render the service of which it should be capable. Sick and injured workers who use the services of such a department are usually in an unsettled mental or physical state, and unsatisfactory environment or conditions naturally will affect them adversely.

The work of the medical department should not be buried in the operating routine of the organization, but by its well chosen location, attractive appearance and effective service, should be made to claim the sympathetic attention of the workers and to make them conscious that their physical well-being during employment is being safeguarded. It should also give to the

owners and managers of the establishment the satisfaction of knowing that human considerations are not crowded out by business routine. An efficiently administered medical department can materially influence the mental attitude and *esprit de corps* of the workers, and thus react favorably upon the financial operation of the establishment.

For the best fulfillment of his functions, the physician in industry should at all times come into close contact with the workers in order to know their working conditions and the various elements in industry that are potential causes of injury or sickness. This work should take him into the operating divisions of the plant, and cooperation with all executives, from the works manager down to the assistant foreman and gang boss, is essential if the medical work is to be carried out in the most satisfactory manner. Close cooperation with those who are charged with the physical safeguarding of the plant premises, machinery and apparatus is especially necessary, and it is here that the physician in industry can become very helpful in pointing out improper sanitary conditions, poor lighting and ventilation, and other unsatisfactory work conditions in connection with manufacturing processes, equipment or methods of operation, which may have escaped notice heretofore. Without reflecting upon the work of the technicians in charge of safety and sanitation, physicians in industry, as experience has repeatedly shown, have been able to suggest practical methods of reducing hazards, and have often helped to increase output by lessening fatigue and increasing productivity of workers through slight changes in operating methods, relocation of apparatus or reassignment of workers. In fact, one of the major qualifications for an efficient physician in industry is his ability to understand the processes and equipment in the plant in which he functions, and to assist all operating officials in securing the highest practical production with the least mental or physical strain upon the producers.

Whenever a medical department is installed in an industrial establishment, it is essential that all injured workers, however slight their injuries may be, should have prompt attention either from the physician or the nurse in that department. The practice of permitting a foreman or a fellow workman or any other uninstructed layman to dress even a slight injury, is one that cannot be criticized too severely. Practically all cases of infection have arisen from such treatments, and infections play a considerable rôle in increasing the time lost and the amount of compensation paid in industrial organizations; and often they lead to serious consequences. In this respect foremen and superintendents occupy strategic positions, for by constant personal contact with the workers they know immediately when a worker is injured, and they are also able quickly to detect, by the quality and quantity of production turned out, early signs

of reduced health or of ill health. Persons of subnormal health should be sent promptly to the medical department for examination.

In large industrial organizations the medical department may, as a matter of practical economy and quick attention to injured or sick persons, deputize and train certain laymen in various parts of the plant, especially foremen, clerks, stock keepers, and like persons, to give first aid to injured and sick workers. In such cases, however, it is of great importance that prompt and adequate notice of such treatment be sent to the medical department, or to some plant official designated for this purpose, in order that the medical department may know of and follow up these cases and prevent infection. These instructed laymen should be provided with proper first-aid outfits. It becomes the duty of the medical department to see that the contents of these outfits are kept up to standard; that they are kept in proper condition, and that the persons authorized to give first aid are properly attending to their duties, when occasion arises, and are not carried away by the natural ambition to attempt more than they are capable of doing and to reach into the physician's field of activity.

As indicated before, the attitude of the plant executives and operating officials toward the work of the medical department is of paramount importance in creating the right attitude of mind among the workers. This holds true especially in reference to physical examination of applicants for employment and to periodic physical examinations of employees. The best way to accomplish this is for executives and operating officials to be the first to submit to such examinations. The willingness of foremen to permit workers to undergo such examinations, even at the cost of a small amount of production time, creates a very wholesome atmosphere among the workers. With cooperation of the medical department undue loss of time by the worker can be checked and avoided. The physician and his assistants by tactful methods can usually convince a malingering worker that repeated visits are unnecessary, while the effect on the great mass of honest, conscientious workers, of a liberal policy permitting them to use the facilities of the medical department on proper occasions, will be very wholesome.

To be of the greatest value to the plant, the medical department must keep accurate and adequate records of certain information pertinent to its work. The cooperation of executives and operating officials will be of material assistance in this respect, and such records will be of assistance in ascertaining unsatisfactory conditions that may exist in certain departments, arising out of physical conditions or of personal relations. With this knowledge at hand, the necessary corrective measures can be applied promptly.

The plan of medical administration in industry, as outlined herein, is influenced largely by the amount of money and attention which industrial executives are willing to expend upon it. In this connection, it is of interest to note that investigations by the Conference Board of Physicians in Industry have shown that for the benefits received by both management and workers, the cost has not been excessive. The first study of the cost of medical work in industry was made in 1915,¹ and showed that an average of \$1.88 per worker, per year, was being spent. A later investigation in 1916,² covering 495,544 employees in 99 industrial establishments, brought this figure up to \$2.21 per worker per year, while a more comprehensive investigation conducted by the National Industrial Conference Board in co-operation with the Conference Board of Physicians in Industry,³ showed the average cost in 1919-1920 to be \$4.43 per worker per year, predicated on a group of 764,827 workers in 207 establishments. This higher cost is accounted for in part by the general increase in the cost of materials and of medical and related services that had occurred during the war period and immediately following, and also by the excessive costs in certain industries, such as those of mining, smelting and refining, foundry production, etc., which unfavorably influenced the average cost. With the elimination of these industries the average cost among the other industries studied, more nearly approaches the average of previous investigations.

Keeping in mind the ability of a successfully conducted medical department on the one hand to reduce workmen's compensation payments and the amount of time lost due to illness, and on the other to increase the general health of the workers, thus resulting in greater contentment and steadier employment, the cost of medical service in industry is a very small amount per worker and certainly an inexpensive insurance of the workers and the plant.

It is confidently believed that, as time passes, medical work in industry will be so improved and the results obtained along the lines indicated above will be so much more beneficial that even increased cost in the operation of properly manned and equipped medical departments will be a more negligible factor than it is at the present time.

There is one more phase of this problem which should be emphasized. Executives and operating officials can, in most instances and without undue hardship, avail themselves of the best medical facilities obtainable for the diagnosis and treatment of such ailments as may afflict them or their families. Such is not the case with the large mass of workers. With their wage

¹Alexander, M. W., "Cost of Health Supervision of Employees." *Iron Age*, Oct. 19, 1916, p. 910.

²Alexander, M. W., "Cost of Health Supervision in Industry." Conference Board of Physicians in Industrial Practice, August, 1917.

³National Industrial Conference Board, "Cost of Health Service in Industry." Research Report No. 37, New York, May, 1921.

incomes and for other reasons, they are not in a position to obtain the best professional advice regarding illness of themselves or their dependents. The far-sighted executive will appreciate the importance of providing means whereby those dependent upon him for a livelihood can secure adequate and satisfactory medical assistance in times of need. This is a social obligation which cannot be avoided, particularly when its favorable consideration is bound up so closely with the welfare of the worker and the profitable conduct of the organization with which he is connected.

Industrial management can well afford to assume this added burden which, if supervised by capable minds, becomes an asset rather than a burden. The provision of means for solving in part, at least, this long standing social question will provide an object lesson for the community and for those responsible as public officials for the care of the people generally. Industrial management should assume leadership in this work, as it has in so many other lines of constructive endeavor, and while its effect upon improved general community health may not become immediately evident, the dividends received in reduced operating expenses, in decrease of time lost from sickness and accidents, and in an increase in the health, contentment and productivity of the workers will be ample reward for its efforts.

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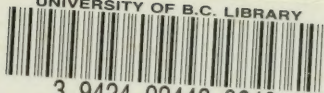
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